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Töredékes tölgy-kőris-szil ligetek a Zákányi-dombokon

(*Knautio drymeiae-Ulmetum* Borhidi et Kevey 1996)

Kevey Balázs[1,2]

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Kevey, B.: *Riparian hardwood forest fragments at the Zákány Hills (Knautio drymeiae-Ulmetum Borhidi et Kevey 1996).*
Abstract: The Zákány Hills are situated along the Dráva River in southwestern Hungary, where I collected 10 vegetation samples and studied the phytosociological characteristics of the riparian hardwood forest (*Knautio drymeiae-Ulmetum*). Its strongly fragmented stands occur primarily on the riverside foothills, where the thick gravel deposit is covered with a shallow layer of loess. These forest fragments are in contact most often with alder gallery forests (*Carici pendulae-Alnetum*) and oak hornbeam forests (*Anemoni trifoliae-Carpinetum*). The stands host some herbaceous species (*Anemone trifolia, Lamium orvala*) that occur nowhere else in the country and indicate sub-Mediterranean and Illyrian influences.

Keywords: Syntaxonomy, Duna–Dráva National Park, SW. Hungary, cluster-analysis, ordination.

Bevezetés

A Zákányi-dombok erdeiről készült cikksorozatom (vö. Kevey 2008a, 2008b, 2008c, 2008-2009, 2010, 2012) legújabb része a tölgy-kőris-szil ligetek (*Knautio drymeiae-Ulmetum*) leírását tartalmazza, 1984-ben készült, 10 növénycönológiai felvétel alapján.

Anyag és módszer

Kutatási terület jellemzése

A kavicsból és löszből felépült Zákányi-dombokon helyenként kisebb kiterjedésű tölgy-kőris-szil ligetek találhatók. Állományaik nagyobb része a Zákány vasútállomás és a Belezna vasúti megálló között húzódó ún. „Vasút-oldal" Dráva felőli lábánál, kisebb része pedig a dombok völgyeiben csörgedező patakok mentén található. A vizsgált tölgy-kőris-szil ligetek 130-170 m tengerszint feletti magasság mellett fordulnak elő. Megfigyelések szerint mikroklímájuk hűvös és párás. Termőrétegük a domboldalakról lemosódó talajrészecskék felhalmozódása révén létrejött lejtőhordalék talaj. A flóra- és vegetáció-kutatás történetét (vö. Károlyi 1949, Károlyi és Pócs 1948-1954, 1957, 1964, 1968, 1969, 1970, Károlyi et al. 1971, 1972, 1974; Balogh et al., 1975, Kovács J. A. 2005 stb.) egy korábbi közleményemben (vö. Kevey 2008b) részletesen ismertettem.

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Alkalmazott módszerek

A cönológiai felvételek a Zürich-Montpellier növénycönológiai iskola (BECKING 1957) hagyományos kvadrát-módszerével készültek. A felvételek táblázatos összeállítása, valamint a karakterfajok csoportrészesedésének és csoporttömegének kiszámítása az „NS" számítógépes programcsomaggal (KEVEY és HIRMANN 2002) történt. A felvételkészítés és a hagyományos statisztikai számítások – kissé módosított – módszerét korábban részletesen közöltem (KEVEY 2008a). A SYN-TAX 2000 program (PODANI 2001) segítségével bináris cluster analízist (Method: Complete link; Coefficient: Baroni-Urbani – Buser) és ordinációt (Method: Principal coordinates analysis; Coefficient: Baroni-Urbani – Buser) végeztem.

A fajok esetében HORVÁTH F. et al. (1995), a társulásoknál pedig az újabb nómenklatúrát (BORHIDI és KEVEY 1996, BORHIDI 2003, KEVEY 2008a) követem. A társulástani és a karakterfaj-statisztikai táblázatok felépítése az újabb eredményekkel (OBERDORFER 1992, MUCINA et al. 1993, BORHIDI 2003, KEVEY 2006a, 2008) módosított SOÓ (1980) féle cönológiai rendszerre épül. A növények cönoszisztematikai besorolásánál elsősorban a hazai szakirodalmat (SOÓ 1964, 1966, 1968, 1970, 1973, 1980, BORHIDI 1993, 1995; HORVÁTH F. et al. 1995, KEVEY 2008) vettem figyelembe.

Eredmények

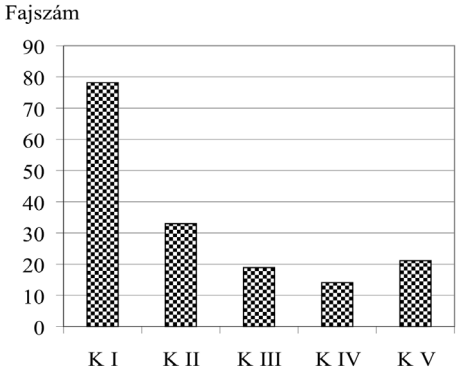
Fiziognómia

A vizsgált tölgy-kőris-szil ligetek lombkoronaszintje az állomány korától függően 15–28 m magas, közepesen, vagy jól záródó (70–80 %). Viszonylag állandó (K IV) faja a *Quercus robur* és a tájidegen *Robinia pseudo-acacia*. Konszociációt képezhet az *Acer campestre*, a *Fraxinus excelsior*, a *Populus tremula*, a *Quercus petraea* és az idegenhonos *Quercus rubra*. Az alsó lombkoronaszint változóan fejlett, magassága 8–16 m, borítása pedig 15–40 %. Főleg alászorult fák alkotják. Állandó (K IV-V) fajai az *Acer campestre*, a *Carpinus betulus*, a *Corylus avellana*, a fákra felkapaszkodó *Hedera helix*, az *Ulmus minor* és a tájidegen *Robinia pseudo-acacia*. Jellemző, hogy több cserje- (*Cornus sanguinea, Corylus avellana, Crataegus monogyna, Euonymus europaeus, Padus avium*) és liánfaj (*Clematis vitalba, Hedera helix, Vitis riparia*) is eléri ezt a szintet. A cserjeszint szintén változóan fejlett. Magassága 2–3,5 m, borítása pedig 25–75 %. Részben a lombkoronaszint fáinak fiatal egyedei képezik (*Acer campestre, A. pseudoplatanus, Carpinus betulus*). Állandó (K IV-V) fajai a következők: *Acer campestre, Cornus sanguinea, Corylus avellana, Euonymus europaeus, Hedera helix, Sambucus nigra, Ulmus minor*. Tömegesebb cserjéi a *Corylus avellana, a Sambucus nigra* és a *Staphylea pinnata*. Az alsó cserjeszint (újulat) borítása 5–50 %. Állandó (K IV-V) fajai az *Acer campestre*, az *Euonymus europaea*, a *Hedera helix*, a *Rubus caesius*, a *Sambucus nigra* és az *Ulmus minor*. Közülük a *Hedera helix* néhol fáciesképző. A gyepszint borítása 60–100 %, viszonylag sok állandó (K IV-V) fajjal: *Aegopodium podagraria, Asarum europaeum, Carex sylvatica, Corydalis cava, Dentaria bulbifera, Equisetum telmateia, Ficaria verna, Gagea lutea, Galanthus nivalis, Galeobdolon luteum, Galeopsis speciosa, Galium aparine, Geranium phaeum, Geum urbanum, Heracleum sphondylium, Humulus lupulus, Knautia drymeia, Polygonatum multiflorum, Pulmonaria officinalis, Ranunculus lanuginosus, Stachys sylvatica, Stellaria holostea, Symphytum tuberosum, Urtica dioica*. Fáciest képezhet az *Aegopodium podagraria*, az *Allium ursinum*, a *Corydalis cava*, a *Ficaria verna*, és a *Galeobdolon luteum*.

Fajkombináció

Állandósági osztályok eloszlása

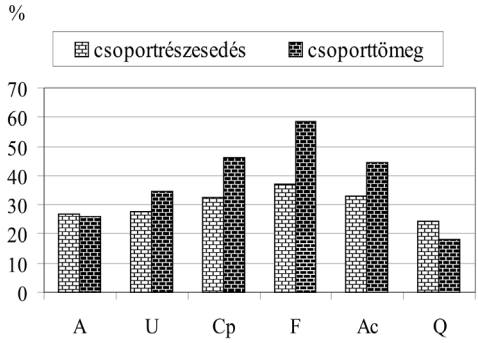
A 10 cönológiai felvétel alapján a társulásban 21 konstans és 14 szubkonstans faj szerepel az alábbiak szerint: – K V: *Acer campestre, Aegopodium podagraria, Carex sylvatica, Carpinus betulus, Cornus sanguinea, Corylus avellana, Dentaria bulbifera, Euonymus europaea, Ficaria verna, Galeobdolon luteum, Galeopsis speciosa, Galium aparine, Hedera helix, Heracleum sphondylium, Pulmonaria officinalis, Rubus caesius, Sambucus nigra, Stellaria holostea, Symphytum tuberosum, Ulmus minor, Urtica dioica*. – K IV: *Asarum europaeum, Corydalis cava, Equisetum telmateia, Gagea lutea, Galanthus nivalis, Geranium phaeum, Geum urbanum, Humulus lupulus, Knautia drymeia, Polygonatum multiflorum, Quercus robur, Ranunculus lanuginosus, Robinia pseudo-acacia, Stachys sylvatica*. Ezen kívül 19 akcesszórikus (K III), 33 szubakcesszórikus (K II) és 78 akcidens (K I) faj került elő (1. táblázat, 1. ábra). Az állandósági osztályok fajszáma tehát az akcidens fajoktól a szubkonstans elemekig csökken, majd a konstans fajoknál ismét lényegesen magasabb.



1. ábra: Az állandósági osztályok eloszlása

Karakterfajok aránya

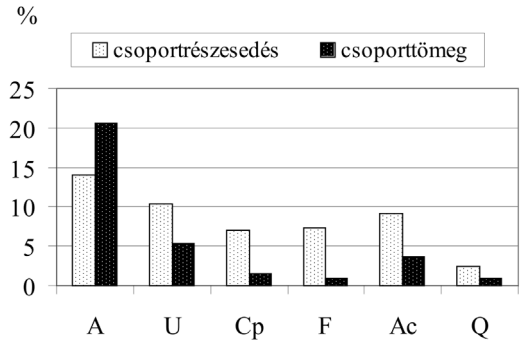
A Zákányi-dombok gyertyános-tölgyeseiben sok szubmontán – *Fagetalia* jellegű – elem talál menedéket: – K V: *Aegopodium podagraria, Carex sylvatica, Carpinus betulus, Dentaria bulbifera, Galeobdolon luteum, Galeopsis speciosa, Hedera helix, Pulmonaria officinalis, Stellaria holostea, Symphytum tuberosum*. – K IV: *Asarum europaeum, Corydalis cava, Gagea lutea, Galanthus nivalis, Geranium phaeum, Knautia drymeia, Polygonatum multiflorum, Ranunculus lanuginosus, Stachys sylvatica*. – K III: *Acer pseudo-platanus, Aconitum vulparia, Arum maculatum, Corydalis solida, Dryopteris filix-mas, Lilium martagon, Scilla drunensis*. – K II: *Allium ursinum, Anemone nemorosa, A. ranunculoides, Athyrium filix-femina, Cerasus avium,Circaea lutetiana, Galium odoratum, Lathraea squamaria, Mercurialis perennis, Oxalis acetosella, Primula vulgaris, Rubus hirtus, Ulmus glabra*. – K I: *Astrantia major, Cardamine impatiens, Carex pilosa, Cerastium sylvaticum, Fagus sylvatica, Galium sylvaticum, Lathyrus vernus, Milium effusum, Moehringia trinervia, Paris quadrifolia, Salvia glutinosa, Senecio nemorensis ssp. nemorensis, Vinca minor, Viola sylvestris*. A *Fagetalia* fajok – mintegy 27,4% csoportrészesedéssel és 34,4% csoporttömeggel – jelentős szerepet játszanak a társulás felépítésében (2. táblázat, 2. ábra).



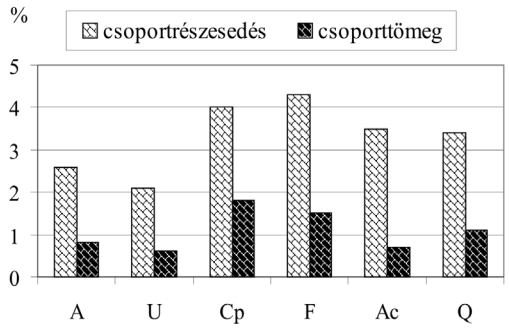
2. ábra: A *Fagetalia* fajok csoportrészesedése és csoporttömege a Zákányi-dombok erdeiben
A: égerliget – *Carici pendulae-Alnetum* (Kevey 2008-2009: 25 felv.), U: tölgy-kőris-szil liget – *Knautio drymeiae-Ulmetum* (Kevey ined.: 10 felv.), Cp: gyertyános-tölgyes – *Anemoni trifoliae-Carpinetum* (Kevey ined.: 50 felv.), F: bükkös – *Doronico austriaci-Fagetum* (Kevey 2008b: 25 felv.), Ac: szurdokerdő – *Polysticho setiferi-Aceretum* (Kevey 2008c: 5 felv.), Q: cseres-tölgyes – *Asphodelo-Quercetum roboris* (Kevey 2010: 10 felv.)

Az asszociáció karakterét részben az Alnion incanae jellegű fajok adják: – K III: *Padus avium, Rumex sanguineus*. – K II: *Carex brizoides, Frangula alnus, Fraxinus angustifolia ssp. pannonica, Viburnum opulus*. – K I: *Alnus glutinosa, A. incana, Aruncus sylvestris, Carex pendula, C. remota, C. strigosa, Cerastium sylvaticum, Crepis paludosa, Doronicum austriacum, Dryopteris carthusiana, D. dilatata, Equisetum telmateia, Paris quadrifolia, Populus alba, Ribes rubrum, Senecio nemorensis ssp. nemorensis, Ulmus laevis, U. minor*. E növények 10,3% csoportrészesedést és 5,3% csoporttömeget mutatnak (2. táblázat, 3. ábra).

Megjelenik néhány szubmediterrán és illír elterjedésű faj is, amelyek – legalábbis részben – az *Aremonio-Fagion* csoportot képviselik (némelyikük *Quercion farnetto*,



3. ábra: Az *Alnion incanae* fajok csoportrészesedése és csoporttömege a Zákányi-dombok erdeiben
A: égerliget – *Carici pendulae-Alnetum* (Kevey 2008-2009: 25 felv.), U: tölgy-kőris-szil liget – *Knautio drymeiae-Ulmetum* (Kevey ined.: 10 felv.), Cp: gyertyános-tölgyes – *Anemoni trifoliae-Carpinetum* (Kevey ined.: 50 felv.), F: bükkös – *Doronico austriaci-Fagetum* (Kevey 2008b: 25 felv.), Ac: szurdokerdő – *Polysticho setiferi-Aceretum* (Kevey 2008c: 5 felv.), Q: cseres-tölgyes – *Asphodelo-Quercetum roboris* (Kevey 2010: 10 felv.)



4. ábra: Az *Aremonio-Fagion* fajok csoportrészesedése és csoporttömege a Zákányi-dombok erdeiben

A: égerliget – *Carici pendulae-Alnetum* (Kevey 2008-2009: 25 felv.), U: tölgy-kőris-szil liget – *Knautio drymeiae-Ulmetum* (Kevey ined.: 10 felv.), Cp: gyertyános-tölgyes – *Anemoni trifoliae-Carpinetum* (Kevey ined.: 50 felv.), F: bükkös – *Doronico austriaci-Fagetum* (Kevey 2008b: 25 felv.), Ac: szurdokerdő – *Polysticho setiferi-Aceretum* (Kevey 2008c: 5 felv.), Q: cseres-tölgyes – *Asphodelo-Quercetum roboris* (Kevey 2010: 10 felv.)

vagy egyéb jelleget is mutat): – K IV: *Knautia drymeia*. – K III: *Anemone trifolia*. – K II: *Castanea sativa, Lamium orvala, Primula vulgaris, Tamus communis*. – K I: *Carex strigosa*. Csoportrészesedésük mindössze 2,1%, csoporttömegük pedig 0,6% (2. táblázat, 4. ábra). E növények közül az *Anemone trifolia* és a *Lamium orvala* Magyarországan ma már csak itt található.

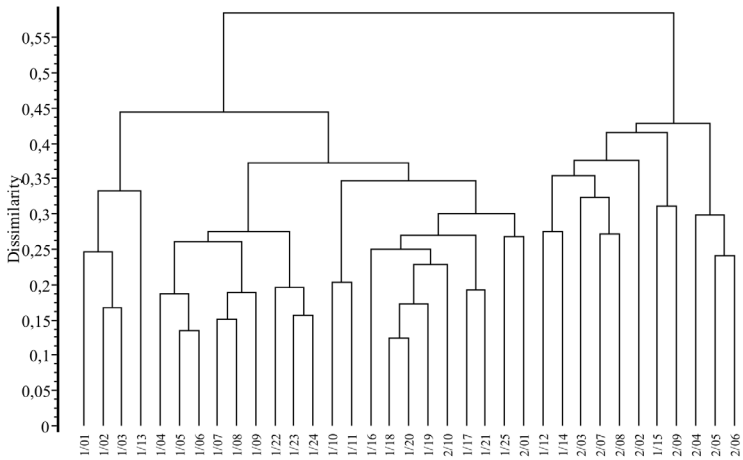
Sokváltozós statisztikai elemzések eredményei

A Zákányi-dombok tölgy-kőris-szil ligeteinek (*Knautio drymeiae-Ulmetum*) és égerligeteinek (*Carici pendulae-Alnetum*) kapcsolatát bináris cluster-analízissel és ordinációval vizsgáltam meg. A dendrogramon (5. ábra) és az ordinációs diagramon (6. ábra) a két asszociáció nem különíthető el élesen. A tölgy-kőris-szil ligethez tartozó felvételek nagyobb része ugyan egy viszonylag jól körülhatárolható csoportba került, de a felvételek kisebb része átkerült az égerliget felvételei közé és fordítva.

Hasonló módon megvizsgáltam a környékbeli tájak tölgy-kőris-szil ligeteinek egymáshoz való viszonyát. E tekintetben a Zákányi-dombokról, Belső-Somogy homokvidékéről, valamint a somogyi Dráva-síkról származó felvételek három jól elkülönülő csoportba rendeződnek. A Zákányi-dombok felvételei mindkét szomszédos táj felvételeitől elkülönülnek (9-10. ábra).

Megvitatás

A Zákányi-dombok tölgy-kőris-szil ligetei a *Fagetalia* és az *Aremonio-Fagion* fajok arányát tekintve az égerligetekhez (*Carici pendulae-Alnetum*) állnak a legközelebb (2. és 4. ábra). A két asszociációt a sokváltozós analízisekkel nem sikerült élesen elválasztani (5-6. ábra). Ennek oka az, hogy a felvételek között akad néhány átmeneti jellegű állomány. Ezek feltehetően tévesen – a lombkoronaszint domináns fafajai szerint – lettek besorolva egyik, vagy másik asszociációba. Ha ezt a néhány felvételt (1/12, 1/14, 1/15,

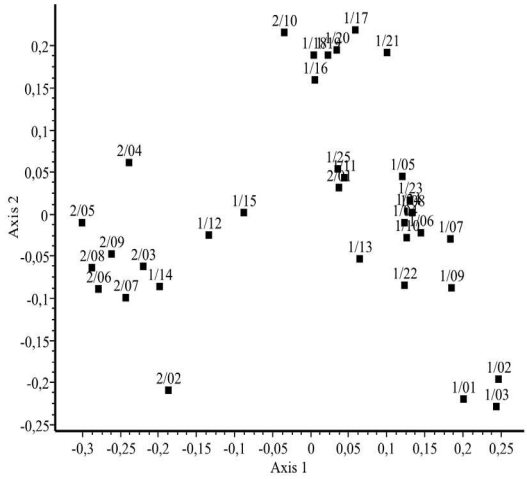


5. ábra: A Zákányi-dombok ligeterdeinek dendrogramja I.

1/1-25: égerliget – *Carici pendulae-Alnetum* (Kevey 2008-2009); 2/1-10: tölgy-kőris-szil liget – *Knautio drymeiae-Ulmetum* (Kevey ined.); (Method: Complete link; Coefficient: Baroni-Urbani – Buser)

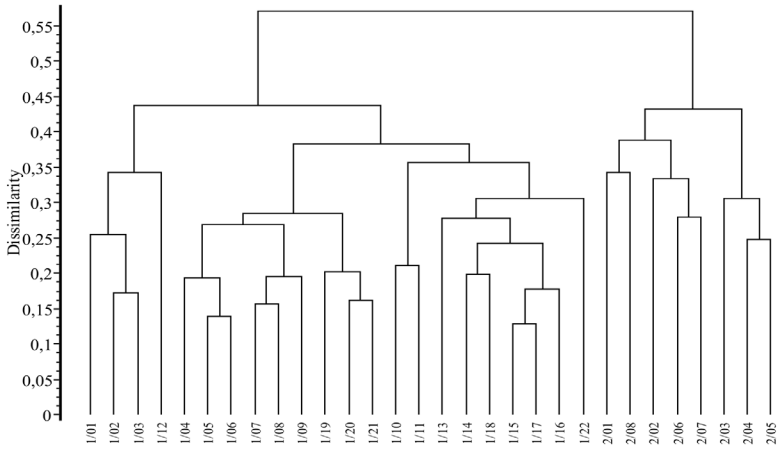
ill. 2/1, 2/10) kivesszük az elemzési anyagból, a dendrogramon (7. ábra) és az ordinációs diagramon (8. ábra) a két asszociáció már megnyugtató módon elkülönül.

Ha összehasonlítjuk a Zákányi-dombok tölgy-kőris-szil ligeteit a szomszédos Belső-Somogy és a Dráva-sík hasonló erdeivel, a dendrogramon (9. ábra) és az ordinációs diagramon (10. ábra) a felvételek három viszonylag jól elkülöníthető csoportba tömörülnek. Ennek értelmében továbbra is nyitott a kérdés, hogy a zákányi tölgy-kőris-szil



6. ábra: A Zákányi-dombok ligeterdeinek ordinációs diagramja I.

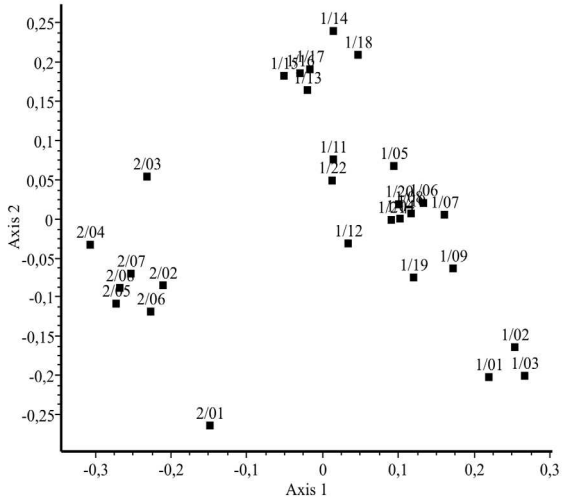
1/1-25: égerliget – *Carici pendulae-Alnetum* (Kevey 2008-2009); 2/1-10: tölgy-kőris-szil liget – *Knautio drymeiae-Ulmetum* (Kevey ined.); (Method: Principal coordinates analysis; Coefficient: Baroni-Urbani – Buser)



7. ábra: A Zákányi-dombok ligeterdeinek dendrogramja II.

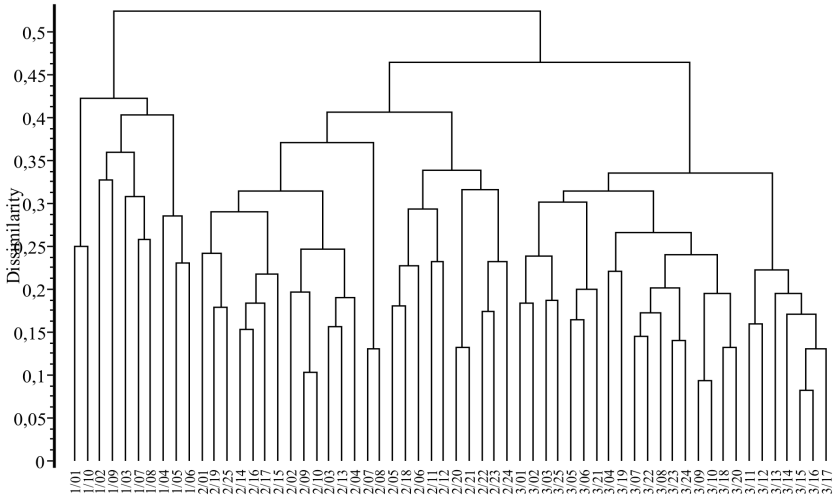
1/1-22: égerliget – *Carici pendulae-Alnetum* (Kevey 2008-2009); 2/1-8: tölgy-kőris-szil liget – *Knautio drymeiae-Ulmetum* (Kevey ined.); (Method: Complete link; Coefficient: Baroni-Urbani – Buser)

ligetek mely asszociációval azonosíthatók: a belső-somogyi *Knautio drymeiae-Ulmetum*-mal, vagy a dráva-síki *Carici brizoidis-Ulmetum*-mal? E kérdés eldöntése azért is nehéz, mert a zákányi állományok erősen fragmentáltak és izoláltak, s fajkészletük ennek megfelelően némileg átalakulhatott. Mivel nem síksággal, hanem dombvidéki tájjal állunk szemben, e tölgy-kőris-szil ligeteket a dél-dunántúli dombságokra értelmezett (vö. BORHIDI és KEVEY 1996, KEVEY 2008a) *Knautio drymeiae-Ulmetum* asszociációval



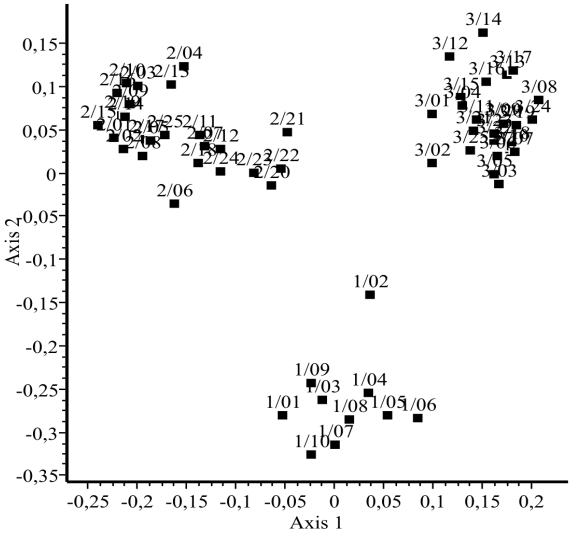
8. ábra: A Zákányi-dombok ligeterdeinek ordinációs diagramja II.

1/1-22: égerliget – *Carici pendulae-Alnetum* (Kevey 2008-2009); 2/1-8: tölgy-kőris-szil liget – *Knautio drymeiae-Ulmetum* (Kevey ined.); (Method: Principal coordinates analysis; Coefficient: Baroni-Urbani – Buser)



9. ábra: Tölgy-kőris-szil ligeterdők dendrogramja

1/1-10: *Knautio drymeiae-Ulmetum* – Zákányi-dombok (Kevey ined.); 2/1-25: *Knautio drymeiae-Ulmetum* – Belső-Somogy (Kevey ined.); 3/1-25: *Carici brizoidis-Ulmetum* – Somogyi Dráva-sík (Kevey 2006b); (Method: Complete link; Coefficient: Baroni-Urbani – Buser)



10. ábra: Tölgy-kőris-szil ligeterdők ordinációs diagramja

1/1-10: Knautio drymeiae-Ulmetum – Zákányi-dombok (Kevey ined.); 2/1-25: Knautio drymeiae-Ulmetum – Belső-Somogy (Kevey ined.); 3/1-25: Carici brizoidis-Ulmetum – Somogyi Dráva-sík (Kevey 2006b); (Method: Principal coordinates analysis; Coefficient: Baroni-Urbani – Buser)

érdemes azonosítani. Helye a növénytársulások rendszerében az alábbi módon vázolható:

Divízió: **Q u e r c o - F a g e a** Jakucs 1967
Osztály: **Querco-Fagetea** Br.-Bl. et Vlieger in Vlieger 1937 em. Borhidi in Borhidi et Kevey 1996
Rend: ***Fagetalia sylvaticae*** Pawłowski in Pawłowski et al. 1928
Csoport: **Alnion incanae** Pawłowski in Pawłowski et al. 1928
Társulás: ***Knautio drymeiae-Ulmetum*** Borhidi et Kevey 1996
[Syn.: *Querco-Ulmetum hungaricum ruscetosum* Soó 1958 (2b. §, 34, §), *Fraxino pannonicae-Ulmetum praeillyricum* Soó 1964 (2b. §, 34. §), *Rusco-Fraxino-Ulmetum* Soó 1971 (10a. §).

Természetvédelmi vonatkozások

A Zákányi-dombok tölgy-kőris-szil ligetei – némileg degradált állapotuk ellenére – hazai vegetációnk értékes mozaikjait képezik. A 10 felvételből 17 védett növényfaj került elő, amelyek egy része szubmediterrán és illír jellegű elterjedést mutat: – K IV: Galanthus nivalis. – K III: *Aconitum vulparia, Anemone trifolia, Lilium martagon, Scilla drunensis*. – K II: *Carex strigosa, Lamium orvala, Primula vulgaris, Tamus communis*. – K I: *Astrantia major, Aruncus sylvestris, Doronicum austriacum, Dryopteris carthusiana, Dr. dilatata, Leucojum aestivum, Ornithogalum sphaerocarpum, Scrophularia scopolii*. Legjelentősebb közülük a csak itt található *Anemone trifolia* és a *Lamium orvala*, míg a *Doronicum austriacum* nálunk nyugat-dunántúli elterjedést mutat. Más fajok elterjedési súlypontja hazánkban elsősorban Dél-Dunántúl, ill. a Dunántúli-középhegység nyugati fele: *Carex strigosa, Primula vulgaris, Scilla drunensis, Scrophularia scopolii, Tamus communis*.

Sajnos annak ellenére, hogy e tölgy-kőris-szil ligetek a Duna-Dráva Nemzeti Park részét képezik, védelmük érdekében még sok teendő várat magára. Amúgy is kicsiny kiterjedésű állományaikban agresszívan terjeszkedik az idegenhonos *Robinia pseudo-acacia*, s emiatt az aljnövényzet több helyen degradálódott. Az egyik vágásterületet mintegy 40 éve a tájidegen *Quercus rubra*-val telepítették be. Itt fokozatos faállomány-cserére lenne szükség. Előkerültek egyéb idegenhonos fajok is (*Helianthus tuberosus, Impatiens parviflora, Juglans regia, Morus alba, Solidago gigantea, Stenactis annua, Vitis riparia*), de a tölgy-kőris-szil ligetekben ezek jelentős zavaró hatást nem fejtenek ki. Illegális szemétlerakások és fakivágások viszont tovább rontják az aljnövényzet állapotát.

Összefoglalás

Jelen tanulmány a Drávát szegélyező Zákányi-dombok tölgy-kőris-szil ligeteinek (*Knautio drymeiae-Ulmetum*) társulási viszonyait mutatja be 10 cönológiai felvétel alapján. Állományai elsősorban a dombvonulat Dráva felőli lábánál találhatók, ahol a folyami kavics alapkőzetet vékony lösztakaró borítja. E tölgy-kőris-szil ligetek legtöbbször égerligetekkel (*Carici pendulae-Alnetum*) és gyertyános-tölgyesekkel (*Anemoni trifoliae-Carpinetum*) érintkeznek. A fragmentált és izolált, gyakran átmeneti jellegű állományok

miatt az asszociációk elválasztása nehézségekbe ütközik. A szubmediterrán és illír hatás alatt álló tölgy-kőris-szil ligetekben olyan növények is előfordulnak, amelyek az országban másutt nem találhatók (*Anemone trifolia, Lamium orvala*).

Rövidítések

A1: felső lombkoronaszint; A2: alsó lombkoronaszint; AF : Aremonio-Fagion; Agi: Alnenion glutinosae-incanae; Ai: Alnion incanae; Alo: Alopecurion pratensis; AQ: Aceri tatarici-Quercion; Ar: Artemisietea; Arn: Arrhenatherion elatioris; Ate: Alnetea glutinosae; B1: cserjeszint; B2: újulat; Ber: Berberidion; Bia: Bidentetea; Bin: Bidention tripartiti; C: gyepszint; Cal: Calystegion sepium; Cgr: Caricenion gracilis; Che: Chenopodietea; ChS: Chenopodio-Scleranthea; Cp: Carpinenion betuli; Des: Deschampsion caespitosae; Epa: Epilobietea angustifolii; Epn: Epilobion angustifolii; EuF: Eu-Fagenion; F: Fagetalia sylvaticae; FiC: Filipendulo-Cirsion oleracei; FPe: Festuco-Puccinellietea; Fru: Festucion rupicolae; GA: Galio-Alliarion; GU: Galio-Urticetea; ined.: ineditum (kiadatlan közlés); Mag: Magnocaricetalia; Moa: Molinietalia coeruleae; MoA: Molinio-Arrhenatherea; MoJ: Molinio-Juncetea; Mon: Molinion coeruleae; Nc: Nanocyperion flavescentis; Pla: Plantaginetea; Pna: Populenion nigro-albae; PQ: Pino-Quercetalia; Prf: Prunion fruticosae; Pru: Prunetalia spinosae; Pte: Phragmitetea; Qc: Quercetalia cerridis; Qfa: Quercion farnetto; QFt: Querco-Fagetea; Qpp: Quercetea pubescentis-petraeae; Qr: Quercetalia roboris; S: summa (összeg); Sal: Salicion albae; SCn: Scheuchzerio-Caricetea nigrae; Sea: Secalietea; s.l.: sensu lato (tágabb értelemben); Spu: Salicetea purpureae; TA: Tilio platyphyllae-Acerenion pseudoplatani; TrP: Triseto-Polygonion bistortae; Ulm: Ulmenion; US: Urtico-Sambucetea; VP: Vaccinio-Piceetea.

1. táblázat. ***Knautio drymeiae-Ulmetum***

1/1. táblázat		1	2	3	4	5	6	7	8	9	10	A-D	K	%
1. Querco-Fagea divisio														
1.1. Salicetea purpureae classis														
1.1.1. Salicetalia purpureae ordo														
Populus nigra	A1	-	1	-	-	-	-	-	+	-	-	+-1	I	20
1-1-1-1- Salicion albae alliance														
Humulus lupulus (Cal,Ate,Ai)	C	-	+	+	+	+	2	+	+	+	-	+-2	IV	80
Cucubalus baccifer (Cal,Ulm)	C	-	+	-	-	+	+	-	-	+	-	+	II	40
Salix alba (Ai,Cal)	A1	-	-	-	-	-	-	+	-	-	-	+	I	10
	A2	-	-	-	-	-	-	+	-	-	-	+	I	10
	B1	-	-	+	-	-	-	-	-	-	-	+	I	10
	S	-	-	+	-	-	-	+	-	-	-	+	I	20
Salix fragilis (Ai,Cal)	A1	-	-	-	-	-	-	-	+	-	-	+	I	10
	A2	-	+	-	-	-	-	-	-	-	-	+	I	10
	S	-	+	-	-	-	-	-	+	-	-	+	I	20
Alnus incana (Ai,Agi)	A2	-	+	-	-	-	-	-	-	-	-	+	I	10
Leucojum aestivum (Des)	C	-	-	+	-	-	-	-	-	-	-	+	I	10
1.2. Alnetea glutinosae classis														
1.2.1. Alnetalia glutinosae ordo														
Alnus glutinosa (Ate,Ai,Agi)	A1	1	-	-	-	-	-	2	-	-	-	1-2	I	20
	A2	1	-	-	-	-	-	1	-	-	-	1	I	20
	S	2	-	-	-	-	-	2	-	-	-	2	I	20
Dryopteris carthusiana (F,Agi,Qr,VP)	C	+	-	-	-	+	-	-	-	-	-	+	I	20
Dryopteris dilatata (F,Agi,Qr,VP)	C	-	-	-	-	-	-	-	-	-	+	+	I	10
1.3. Querco-Fagetea classis														
Cornus sanguinea (Qpp)	A2	-	-	-	-	-	+	+	-	+	-	+	II	30
	B1	+	2	1	1	+	2	1	1	1	+	+-2	V	100
	B2	+	-	+	+	-	-	-	+	+	-	+	III	50
	S	+	2	1	1	+	2	1	1	1	+	+-2	V	100
Euonymus europaea (Qpp)	A2	-	-	-	-	-	-	-	-	+	-	+	I	10
	B1	1	2	1	+	+	1	+	+	+	+	+-2	V	100
	B2	+	+	+	+	+	+	-	+	+	+	+	V	90
	S	1	2	1	+	+	1	+	+	1	+	+-2	V	100
Ficaria verna	C	4	2	2	2	1	3	3	3	3	2	1-4	V	100
Heracleum sphondylium (Qpp,MoA)	C	+	+	+	+	+	+	+	+	+	+	+	V	100
Symphytum tuberosum (Cp,Qpp)	C	+	+	+	1	1	+	+	+	1	+	+-1	V	100
Ulmus minor (Ai,Ulm,Qpp)	A1	-	-	-	-	+	-	-	-	-	-	+	I	10
	A2	+	+	+	1	1	1	1	1	1	-	+-1	V	90
	B1	+	+	-	-	2	1	1	+	-	+	+-2	IV	70
	B2	-	+	-	-	+	+	+	+	1	+	+-1	IV	70
	S	+	1	+	1	2	2	2	1	2	+	+-2	V	100
Acer campestre (Qpp)	A1	-	-	-	2	1	4	2	3	4	-	1-4	III	60
	A2	-	+	1	2	2	2	2	2	2	1	+-2	V	90
	B1	-	+	2	2	1	2	+	1	2	1	+-2	V	90
	B2	-	+	+	+	+	+	+	+	1	+	+-1	V	90
	S	-	1	2	3	2	5	3	4	5	2	1-5	V	90

1. táblázat folytatása: *Knautio drymeiae-Ulmetum*

1/2. táblázat		1	2	3	4	5	6	7	8	9	10	A-D	K	%
Corylus avellana (Qpp)	A2	1	-	+	1	-	+	1	1	2	-	+-2	IV	70
	B1	1	+	1	3	-	+	2	+	2	+	+-3	V	90
	B2	+	+	-	-	-	-	-	-	+	-	+	II	30
	S	2	+	1	3	-	+	2	1	3	+	+-3	V	90
Stellaria holostea (F,Cp)	C	+	+	+	1	+	+	+	-	+	+	+-1	V	90
Geum urbanum (Epa,Cp,Qpp)	C	+	+	+	-	+	-	+	+	+	+	+	IV	80
Polygonatum multiflorum (F)	C	+	-	1	+	+	+	-	+	+	+	+-1	IV	80
Quercus robur (Ai,Cp,Qpp)	A1	-	1	1	2	-	+	1	2	+	-	+-2	IV	70
	A2	-	2	-	-	-	-	-	-	-	-	2	I	10
	B1	-	1	+	-	-	-	-	-	-	-	+-1	I	20
	B2	-	+	+	+	-	-	+	-	-	-	+	II	40
	S	-	2	1	2	-	+	1	2	+	-	+-2	IV	70
Brachypodium sylvaticum (Qpp)	C	+	+	+	-	-	-	+	+	+	-	+	III	60
Ajuga reptans (MoA)	C	-	+	-	-	+	-	+	+	+	-	+	III	50
Clematis vitalba (Qpp)	A2	-	-	-	-	-	+	-	-	-	-	+	I	10
	B1	-	-	-	-	-	+	+	-	1	-	+-1	II	30
	B2	-	-	1	-	+	+	+	-	+	-	+-1	III	50
	S	-	-	1	-	+	1	+	-	1	-	+-1	III	50
Ligustrum vulgare (Cp,Qpp)	B1	-	-	-	+	+	+	-	+	+	-	+	III	50
	B2	-	-	-	+	+	+	-	+	+	-	+	III	50
	S	-	-	-	+	+	+	-	+	+	-	+	III	50
Veronica hederifolia ssp. lucorum	C	+	+	-	+	+	-	-	-	+	-	+	III	50
Carex divulsa	C	-	+	+	-	+	-	-	-	+	-	+	II	40
Crataegus monogyna (Qpp)	A2	-	+	-	-	-	-	-	-	-	-	+	I	10
	B1	-	+	-	+	-	-	-	+	+	-	+	II	40
	B2	-	-	-	+	-	-	-	-	-	-	+	I	10
	S	-	+	-	+	-	-	-	+	+	-	+	II	40
Tilia cordata (Cp,Qpp)	A1	+	-	+	-	-	-	-	+	-	-	+	II	30
	B1	-	-	+	-	-	-	-	+	-	-	+	I	20
	B2	+	-	-	-	-	-	-	-	-	-	+	I	10
	S	+	-	+	-	-	-	-	+	-	-	+	II	30
Viola cyanea (Qpp)	C	-	+	-	-	-	+	-	-	+	-	+	II	30
Campanula trachelium (Epa,Cp)	C	-	-	+	-	-	-	-	-	+	-	+	I	20
Dactylis polygama (Qpp,Cp)	C	-	+	-	-	-	-	-	-	+	-	+	I	20
Fraxinus excelsior (Qpp,TA)	A1	4	-	-	-	-	-	-	-	-	5	4-5	I	20
	A2	2	-	-	-	-	-	-	-	-	2	2	I	20
	B1	2	-	-	-	-	-	-	-	-	-	2	I	10
	B2	+	-	-	-	-	-	-	-	-	-	+	I	10
	S	5	-	-	-	-	-	-	-	-	5	5	I	20
Lapsana communis (Qpp,GA,Epa)	C	-	+	-	-	-	-	-	-	+	-	+	I	20
Populus tremula (Qr,Qc,Ber)	A1	-	4	2	-	-	-	-	-	-	-	2-4	I	20
	A2	-	2	1	-	-	-	-	-	-	-	1-2	I	20
	B1	-	+	-	-	-	-	-	-	-	-	+	I	10
	S	-	5	2	-	-	-	-	-	-	-	2-5	I	20

1. táblázat folytatása: *Knautio drymeiae-Ulmetum*

1/3. táblázat		1	2	3	4	5	6	7	8	9	10	A-D	K	%
Quercus petraea agg. (Qpp)	A1	-	-	-	3	3	-	-	-	-	-	3	I	20
	B2	-	-	-	-	+	-	-	-	-	-	+	I	10
	S	-	-	-	3	3	-	-	-	-	-	3	I	20
Ranunculus auricomus agg. (MoA)	C	-	-	-	+	-	-	-	-	-	+	+	I	20
Scrophularia nodosa (GA,Epa)	C	-	-	+	-	-	-	-	-	+	-	+	I	20
Staphylea pinnata (Cp,TA)	A2	-	-	-	-	-	-	-	+	-	-	+	I	10
	B1	-	-	-	-	-	-	-	3	+	-	+-3	I	20
	B2	-	-	-	-	-	-	-	+	1	-	+-1	I	20
	S	-	-	-	-	-	-	-	3	1	-	1-3	I	20
Vicia dumetorum (Qpp)	C	-	-	-	-	-	-	+	-	+	-	+	I	20
Crataegus oxyacantha	B1	-	-	-	+	-	-	-	-	-	-	+	I	10
Loranthus europaeus (Cp,Qpp)	A1	-	+	-	-	-	-	-	-	-	-	+	I	10
Poa nemoralis (Qpp)	C	-	-	-	-	+	-	-	-	-	-	+	I	10
Rhamnus catharticus (Qpp,Pru)	A2	-	+	-	-	-	-	-	-	-	-	+	I	10
	B1	-	+	-	-	-	-	-	-	-	-	+	I	10
	B2	-	+	-	-	-	-	-	-	-	-	+	I	10
	S	-	+	-	-	-	-	-	-	-	-	+	I	10
Viola odorata	C	-	+	-	-	-	-	-	-	-	-	+	I	10
1.3.1. Fagetalia sylvaticae ordo														
Aegopodium podagraria (Ai,Cp)	C	3	+	+	2	+	2	2	2	2	2	+-2	V	100
Dentaria bulbifera (EuF)	C	+	+	+	1	+	+	+	+	1	1	+-1	V	100
Hedera helix	A1	+	-	-	1	1	-	-	+	-	+	+-1	III	50
	A2	+	-	+	2	1	1	2	1	+	+	+-2	V	90
	B1	+	+	+	+	1	+	1	+	+	1	+-1	V	100
	B2	1	1	2	2	3	1	3	3	3	2	1-3	V	100
	S	1	1	2	3	3	2	4	3	3	2	1-4	V	100
Pulmonaria officinalis	C	3	1	1	1	+	+	+	+	1	+	+-3	V	100
Carex sylvatica	C	+	+	+	+	+	+	+	+	-	+	+	V	90
Carpinus betulus (Cp)	A1	-	-	-	-	-	-	-	1	-	+	+-1	I	20
	A2	+	-	+	1	+	-	+	1	+	1	+-1	IV	80
	B1	+	+	+	-	-	-	-	-	-	+	+	II	40
	B2	+	-	+	-	-	-	+	-	-	-	+	II	30
	S	1	+	1	1	+	-	+	2	+	1	+-2	V	90
Galeobdolon luteum	C	3	+	2	2	-	4	+	3	3	3	+-4	V	90
Galeopsis speciosa (Epn,Ai)	C	+	3	1	+	+	1	+	+	+	-	+-3	V	90
Gagea lutea (Ai,Cp)	C	-	+	+	1	-	+	+	+	+	+	+-1	IV	80
Geranium phaeum	C	1	+	+	1	-	-	+	+	+	+	+-1	IV	80
Ranunculus lanuginosus (Agi,Cp)	C	1	+	+	+	+	-	+	-	+	1	+-1	IV	80
Stachys sylvatica (Epa)	C	-	+	+	+	+	+	+	+	+	-	+	IV	80
Asarum europaeum	C	+	+	+	+	-	-	-	+	1	+	+-1	IV	70
Corydalis cava	C	-	-	1	-	+	3	3	3	2	+	+-3	IV	70
Galanthus nivalis	C	-	+	+	+	+	1	1	+	-	-	+-1	IV	70
Knautia drymeia (Cp)	C	+	1	+	+	-	-	+	-	+	+	+-1	IV	70
Arum maculatum	C	-	-	-	-	+	1	+	+	1	1	+-1	III	60
Corydalis solida	C	+	2	-	-	-	-	+	+	+	+	+-2	III	60

1. táblázat folytatása: *Knautio drymeiae-Ulmetum*

1/4. táblázat		1	2	3	4	5	6	7	8	9	10	A-D	K	%
Acer pseudo-platanus (TA)	A1	-	-	-	-	-	-	-	1	-	+	+-1	I	20
	A2	+	-	-	1	-	-	+	1	-	-	+-1	II	40
	B1	+	-	-	+	-	-	-	+	-	2	+-2	II	40
	B2	+	-	-	-	-	-	-	+	-	+	+	II	30
	S	1	-	-	1	-	-	+	2	-	2	+-2	III	50
Aconitum vulparia	C	+	-	+	+	-	-	-	+	-	+	+	III	50
Dryopteris filix-mas	C	+	+	-	-	-	+	-	-	+	+	+	III	50
Lilium martagon (QFt,Qpp)	C	+	-	+	+	-	-	-	+	-	+	+	III	50
Scilla drunensis (Ai,Cp,Qpp)	C	-	+	+	-	-	+	+	+	-	-	+	III	50
Allium ursinum	C	-	-	-	4	3	-	-	-	3	5	3-5	II	40
Circaea lutetiana (Ai)	C	-	-	+	+	-	-	+	-	-	+	+	II	40
Galium odoratum	C	-	+	1	-	+	-	-	-	+	-	+-1	II	40
Primula vulgaris (AF)	C	+	+	+	-	-	-	-	+	-	-	+	II	40
Ulmus glabra (TA)	A1	-	-	-	-	1	-	-	-	-	-	1	I	10
	A2	-	-	-	-	2	-	+	-	-	-	+-2	I	20
	B1	-	-	+	-	2	-	-	+	-	-	+-2	II	30
	B2	-	-	-	-	+	-	+	-	-	-	+	I	20
	S	-	-	+	-	3	-	+	+	-	-	+-3	II	40
Anemone nemorosa	C	-	-	-	-	-	+	1	+	-	-	+-1	II	30
Anemone ranunculoides	C	-	+	-	-	-	-	1	1	-	-	+-1	II	30
Athyrium filix-femina (Qr,VP)	C	+	+	-	-	-	-	-	-	-	+	+	II	30
Cerasus avium (Cp)	A1	-	-	-	-	-	-	-	+	+	-	+	I	20
	A2	-	-	-	-	-	-	-	+	-	-	+	I	10
	B1	-	-	-	-	-	-	-	-	+	-	+	I	10
	B2	-	-	-	+	-	-	-	-	+	-	+	I	20
	S	-	-	-	+	-	-	-	+	1	-	+-1	II	30
Lathraea squamaria (Cp)	C	-	-	-	-	+	+	-	+	-	-	+	II	30
Mercurialis perennis	C	-	-	-	-	+	-	+	1	-	-	+-1	II	30
Oxalis acetosella (VP)	C	+	-	-	-	-	-	-	-	+	+	+	II	30
Rubus hirtus (Epa,US)	B2	+	-	-	-	-	-	-	+	-	1	+-1	II	30
Cardamine impatiens	C	+	-	-	-	-	-	-	-	+	-	+	I	20
Carex pilosa (Cp)	C	-	-	-	-	-	-	-	-	+	+	+	I	20
Fagus sylvatica (EuF)	A1	-	-	-	-	-	-	-	-	+	+	+	I	20
	A2	-	-	-	-	-	-	-	-	-	+	+	I	10
	S	-	-	-	-	-	-	-	-	+	+	+	I	20
Lathyrus vernus	C	-	-	+	-	-	-	-	+	-	-	+	I	20
Paris quadrifolia (Ate,Ai)	C	+	-	-	-	-	-	-	+	-	-	+	I	20
Viola sylvestris	C	-	+	+	-	-	-	-	-	-	-	+	I	20
Astrantia major (TrP,EuF)	C	-	-	-	-	-	-	-	-	-	+	+	I	10
Cerastium sylvaticum (Ai)	C	-	-	-	-	-	-	-	-	-	+	+	I	10
Galium sylvaticum (Cp,Qr,PQ)	C	-	-	+	-	-	-	-	-	-	-	+	I	10
Milium effusum	C	-	-	+	-	-	-	-	-	-	-	+	I	10
Moehringia trinervia	C	+	-	-	-	-	-	-	-	-	-	+	I	10
Salvia glutinosa	C	-	-	-	-	-	-	-	-	1	-	1	I	10
Senecio nemorensis ssp. nemorensis (Epa,Ai)	C	-	-	-	-	-	-	-	-	+	-	+	I	10
Vinca minor (Cp)	C	-	-	-	-	-	-	-	-	-	+	+	I	10

1. táblázat folytatása: *Knautio drymeiae-Ulmetum*

1/5. táblázat		1	2	3	4	5	6	7	8	9	10	A-D	K	%
1.3.1.1. Alnion incanae alliance														
Padus avium	A2	1	-	+	-	-	+	-	-	-	-	+-1	II	30
	B1	2	+	-	-	-	+	+	-	-	-	+-2	II	40
	B2	-	-	-	-	-	+	+	-	-	-	+	I	20
	S	2	+	+	-	-	1	+	-	-	-	+-2	III	50
Rumex sanguineus (Epa,Sal)	C	-	-	+	+	+	-	+	-	-	+	+	III	50
Carex brizoides (Ate)	C	2	+	+	-	-	-	-	-	-	+	+-2	II	40
Carex strigosa (AF)	C	-	-	+	-	-	-	+	+	-	1	+-1	II	40
Viburnum opulus (Ate)	B1	-	+	+	-	-	+	-	-	+	-	+	II	40
	B2	-	+	+	-	-	-	-	-	+	-	+	II	30
	S	-	+	+	-	-	+	-	-	+	-	+	II	40
Frangula alnus (Ate,Qr,PQ)	B1	+	1	+	-	-	-	-	-	-	-	+-1	II	30
	B2	-	+	-	-	-	-	-	-	-	-	+	I	10
	S	+	1	+	-	-	-	-	-	-	-	+-1	II	30
Fraxinus angustifolia ssp. pannonica (Ate)	A1	-	1	+	-	-	-	-	+	-	-	+-1	II	30
	A2	-	1	+	-	-	-	-	-	-	-	+-1	I	20
	B1	-	+	-	-	-	-	-	-	-	-	+	I	10
	B2	-	+	-	-	-	-	-	-	-	-	+	I	10
	S	-	2	+	-	-	-	-	+	-	-	+-2	II	30
Ribes rubrum	B1	-	-	-	-	-	-	-	-	+	-	+	I	10
	B2	+	-	-	-	-	-	-	-	-	-	+	I	10
	S	+	-	-	-	-	-	-	-	+	-	+	I	20
Carex pendula	C	-	-	-	-	-	-	+	-	-	-	+	I	10
Carex remota	C	-	-	-	-	-	-	-	-	-	+	+	I	10
Crepis paludosa (Moa,Ate)	C	+	-	-	-	-	-	-	-	-	-	+	I	10
Populus alba (Sal,AQ)	A1	-	-	-	-	-	-	-	+	-	-	+	I	10
Ulmus laevis (Sal,Ulm)	A1	-	-	-	2	-	-	-	-	-	-	2	I	10
	A2	-	-	-	1	-	-	-	-	-	-	1	I	10
	B1	-	-	-	+	-	-	-	-	-	-	+	I	10
	B2	-	-	-	+	-	-	-	-	-	-	+	I	10
	S	-	-	-	2	-	-	-	-	-	-	2	I	10
1.3.1.1.1. Alnenion glutinosae-incanae suballiance														
Equisetum telmateia (FiC)	C	+	+	+	-	-	+	+	+	+	1	+-1	IV	80
Doronicum austriacum (FiC,Ate)	C	+	-	-	-	-	-	-	-	-	+	+	I	20
1.3.1.2. Fagion sylvaticae alliance														
1.3.1.2.1. Tilio-Acerenion suballiance														
Aruncus sylvestris (FiC,Agi)	C	+	-	-	-	-	-	-	-	-	-	+	I	10
1.3.1.3. Aremonio-Fagion														
Anemone trifolia	C	+	+	+	+	-	-	-	-	-	+	+	III	50
Lamium orvala	C	-	-	2	-	-	-	+	+	+	-	+-2	II	40
Tamus communis (Qfa)	C	-	+	-	-	-	+	-	-	1	-	+-1	II	30
1.3.2. Quercetalia roboris ordo														
1.3.2.1. Gentiano asclepiadeae-Fagenion alliance														
Castanea sativa (AF,Qfa)	B1	-	-	-	-	+	-	-	-	-	-	+	I	10
	B2	-	+	-	-	-	-	-	-	-	+	+	I	20
	S	-	+	-	-	+	-	-	-	-	+	+	II	30

1. táblázat folytatása: *Knautio drymeiae-Ulmetum*

1/6. táblázat		1	2	3	4	5	6	7	8	9	10	A-D	K	%
1.4. Quercetea pubescentis-petraeae classis														
Prunus spinosa (Pru,Prf)	B1	-	-	+	+	-	+	-	-	-	-	+	II	30
Ornithogalum sphaerocarpum (Cp,Fru)	C	-	-	+	+	-	-	-	-	-	-	+	I	20
Malus sylvestris (Ai,Cp)	A2	-	-	+	-	-	-	-	-	-	-	+	I	10
2. Cypero-Phragmitea divisio														
2.1. Phragmitetea classis														
Solanum dulcamara (Cal,Bia,Spu,Ate,Ai)	C	+	+	+	-	-	-	+	-	+	-	+	III	50
Carex acutiformis (Mag,Cgr,MoJ,Sal,Ate)	C	-	+	-	-	-	-	+	-	-	-	+	I	20
Phalaroides arundinacea (Des)	C	-	-	+	-	-	-	+	-	-	-	+	I	20
Eupatorium cannabinum (Epa,Sal,Ate,Ai,Agi)	C	-	-	-	-	-	-	-	-	+	-	+	I	10
Iris pseudacorus (Sal,Ate,Ai)	C	-	+	-	-	-	-	-	-	-	-	+	I	10
3. Molinio-Arrhenatherea divisio														
Poa trivialis (Pte,Spu,Ate,Ai)	C	+	-	-	-	+	+	+	-	-	+	+	III	50
Colchicum autumnale (Moa)	C	-	+	-	-	-	-	-	-	-	-	+	I	10
3.1. Molinio-Juncetea classis														
Symphytum officinale (Pte,Cal,Spu,Ate,Ai)	C	-	+	-	-	-	-	+	-	-	-	+	I	20
3.1.1. Molinietalia coeruleae ordo														
Angelica sylvestris (Mag,Ate,Ai)	C	-	-	-	-	-	-	+	+	-	-	+	I	20
3.2. Arrhenatheretea classis														
3.2.1. Arrhenatheretalia ordo														
Anthriscus sylvestris (Ar,GA,Spu,Ai)	C	-	-	-	-	+	+	-	-	-	-	+	I	20
4. Chenopodio-Scleranthea divisio														
4.1. Chenopodietea classis														
Arctium lappa (Ar,Pla,Spu)	C	-	-	-	-	-	-	+	-	-	-	+	I	10
4.2. Galio-Urticetea classis														
4.2.1. Calystegietalia ordo														
4.2.1.1. Galio-Alliarion alliance														
Alliaria petiolata (Epa)	C	+	+	-	+	-	-	+	-	+	-	+	III	50
Chaerophyllum temulum	C	-	+	-	-	-	+	-	-	-	-	+	I	20
Scrophularia scopolii	C	-	-	-	-	-	-	-	-	+	-	+	I	10
4.2.1.2. Calystegion sepium alliance														
Bryonia dioica (Ar,Ai)	C	-	-	-	-	+	+	+	-	+	-	+	II	40
Calystegia sepium (Pte,Bia,Pla,Spu,Ate)	C	-	-	+	-	-	-	+	-	+	+	+	II	40
Lamium maculatum (Pna,Agi,F,TA,Qpp)	C	-	+	1	-	-	1	-	-	-	-	+-1	II	30
4.3. Bidentetea classis														
4.3.1. Bidentetalia ordo														
Polygonum hydropiper (Nc,Bin,Spu,Ate,Ai)	C	-	-	-	-	-	-	+	-	-	-	+	I	10
Polygonum mite (Alo,Bin,Spu,Ai)	C	+	-	-	-	-	-	-	-	-	-	+	I	10
5. Indifferens														
Galium aparine (Sea,Epa,QFt)	C	+	2	2	1	+	2	2	1	1	1	+-2	V	100
Rubus caesius (Spu)	B1	-	-	-	-	-	-	-	+	-	-	+	I	10
	B2	+	2	1	1	+	1	1	+	1	1	+-2	V	100
	S	+	2	1	1	+	1	1	+	1	1	+-2	V	100
Sambucus nigra (Epa,US,QFt)	A2	-	-	-	-	-	-	-	+	-	-	+	I	10
	B1	2	2	2	2	2	3	3	+	3	2	+-3	V	100
	B2	+	-	+	+	+	1	1	+	1	1	+-1	V	90
	S	2	2	2	2	2	3	3	1	3	2	1-3	V	100

1. táblázat folytatása: *Knautio drymeiae-Ulmetum*

1/7. táblázat		1	2	3	4	5	6	7	8	9	10	A-D	K	%
Urtica dioica (Ar,GA,Epa,Spu)	C	+	1	+	1	+	1	1	+	1	-	+-1	V	90
Glechoma hederacea (MoA,QFt,Sal,Ai)	C	-	+	-	-	+	+	+	-	-	-	+	II	40
Chelidonium majus (Che,Ar,GA,Epa)	C	-	-	-	-	+	-	+	-	+	-	+	II	30
Equisetum arvense (MoA,Sea,Sal,Ate,Ai)	C	-	-	-	+	-	+	-	+	-	-	+	II	30
Allium scorodoprasum (Qpp,Sea,Che)	C	-	-	+	-	-	-	+	-	-	-	+	I	20
Caltha palustris (Mag,MoJ,Spu,Ate,Ai)	C	+	-	-	-	-	-	-	-	-	+	+	I	20
Ranunculus repens (Pte,MoA,ChS,Spu,Ate)	C	-	+	-	-	-	-	-	-	-	+	+	I	20
Stellaria media (ChS,QFt,Spu)	C	-	-	-	-	-	-	+	+	-	-	+	I	20
Torilis japonica (Ar,GA,Epa,QFt)	C	-	+	-	-	-	-	-	-	+	-	+	I	20
Anthriscus cerefolium (Ar,GA)	C	-	-	-	-	-	-	-	-	-	+	+	I	10
Cruciata laevipes (Am,Fru,Ar,GU,Qpp)	C	-	+	-	-	-	-	-	-	-	-	+	I	10
Lysimachia nummularia (Pte,MoJ,FPe,Bia,QFt)	C	-	-	-	-	-	-	-	+	-	-	+	I	10
Lysimachia vulgaris (Ai,Pte,SCn,MoJ,Sal)	C	-	+	-	-	-	-	-	-	-	-	+	I	10
Rubus fruticosus agg. (QFt,Epa,US)	B2	-	-	+	-	-	-	-	-	-	-	+	I	10
6. Adventiva														
Robinia pseudo-acacia	A1	-	-	2	1	2	1	2	2	2	+	+-2	IV	80
	A2	-	-	+	+	1	2	2	+	2	-	+-2	IV	70
	B1	-	-	+	-	-	1	1	+	1	-	+-1	III	50
	B2	-	-	+	-	-	+	-	-	+	+	+	II	40
	S	-	-	2	1	2	2	3	2	3	+	+-3	IV	80
Juglans regia	A1	-	-	-	-	-	-	+	-	+	-	+	I	20
	A2	-	+	-	-	-	-	+	-	-	-	+	I	20
	B2	-	-	-	-	-	+	-	+	-	-	+	I	20
	S	-	+	-	-	-	+	+	+	+	-	+	III	50
Solidago gigantea	C	-	-	+	-	-	-	-	-	+	-	+	I	20
Stenactis annua	C	-	-	-	-	-	-	+	-	+	-	+	I	20
Helianthus tuberosus	C	-	-	+	-	-	-	-	-	-	-	+	I	10
Impatiens parviflora	C	-	-	-	-	-	-	-	-	+	-	+	I	10
Morus alba	A2	-	+	-	-	-	-	-	-	-	-	+	I	10
	B1	-	+	-	-	-	-	-	-	-	-	+	I	10
	S	-	+	-	-	-	-	-	-	-	-	+	I	10
Quercus rubra	A1	-	-	3	-	-	-	-	-	-	-	3	I	10
	A2	-	-	1	-	-	-	-	-	-	-	1	I	10
	B1	-	-	+	-	-	-	-	-	-	-	+	I	10
	S	-	-	3	-	-	-	-	-	-	-	3	I	10
Vitis riparia	A2	-	+	-	-	-	-	-	-	-	-	+	I	10

Felvételi adatok

1/8. táblázat	1	2	3	4	5	6	7	8	9	10
Minta felvételi sorszáma	6407	5695	5692	3484	8095	8092	8099	8098	4746	4733
Felvételi évszám 1.	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984
Felvételi időpont 1.	04.08	04.08	04.08	04.08	04.08	04.08	04.08	04.08	04.08	04.07
Felvételi évszám 2.	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984
Felvételi időpont 2.	06.27	06.27	06.27	07.18	07.18	07.18	06.27	07.18	07.18	06.28
Tengerszint feletti magasság (m)	170	130	130	130	130	130	130	130	130	160
Kitettség	ÉK	D	-	Ny	DNy	DNy	DNy	DNy	DNy	D
Lejtőszög (fok)	5	2	0	3	3	3	3	3	10	3
A1 borítása (%)	80	75	80	80	70	70	70	75	75	75
A2 borítása (%)	30	35	15	30	35	40	40	35	35	20
B1 borítása (%)	45	40	40	60	55	75	45	45	55	25
B2 borítása (%)	5	25	20	25	50	10	50	50	40	30
C borítása (%)	85	60	75	95	70	90	70	90	90	100
A1 magassága (m)	25	28	15	22	25	26	26	26	22	28
A2 magassága (m)	15	14	8	15	14	12	14	16	14	16
B1 magassága (m)	3	3	2	3	3	3,5	3,5	3	3	2,5
Átlagos törzsátmérő (cm)	40	55	30	50	50	45	50	40	40	50
Felvételi terület nagysága (m^2)	1200	1200	1600	1200	1200	1200	1200	1200	800	1200

Hely: 1: Őrtilos „Szentmihály-hegy: Dűlt-hegy”; 2: Őrtilos „Vasút-oldal: Visszafolyó-dülő”; 3: Őrtilos „Vasút-oldal: Únom-Bánom-hegy”; 4: Őrtilos „Vasút-oldal: Dűlt-hegy”; 5: Őrtilos „Vasút-oldal: Látó-hegy”; 6: Őrtilos „Vasút-oldal: Sorompói-oldal”; 7-9: Őrtilos „Vasút-oldal: Földvári-oldal; 10: Zákány „Vasút-oldal: Hagymás”.
Alapkőzet: 1: lösz; 2-10: kavics és lösz.
Talaj: 1-10: lejtőhordalék-talaj.
Felvételt készítette: 1-10: Kevey (ined.).

2. táblázat: Karakterfajok csoportrészesedése (cs.r.) és csoporttömege (cs.t.)

2/1. táblázat	cs.r.	cs.t.
Cypero-Phragmitea	0,0	0,0
Phragmitetea	0,8	0,1
Magnocaricetalia (incl. Magnocaricion)	0,2	0,0
Caricenion gracilis	0,1	0,0
Magnocaricetalia s.l.	0,3	0,0
Phragmitetea s.l.	1,1	0,1
Cypero-Phragmitea s.l.	1,1	0,1
Molinio-Arrhenatherea	1,6	0,1
Molinio-Juncetea	0,2	0,0
Molinietalia coeruleae	0,2	0,0
Molinion coeruleae	0,1	0,0
Deschampsion caespitosae	0,2	0,0
Filipendulo-Cirsion oleracei	0,8	0,1
Molinietalia coeruleae s.l.	1,3	0,1
Molinio-Juncetea s.l.	1,5	0,1
Arrhenatheretea (incl. Arrhenatheretalia)	0,1	0,2
Triseto-Polygonion bistortae	0,1	0,0
Arrhenatheretea s.l.	0,2	0,0
Molinio-Arrhenatherea s.l.	3,3	0,0
Puccinellio-Salicornea	0,0	0,0
Festuco-Puccinellietea	0,0	0,0
Festuco-Puccinellietalia	0,0	0,0
Juncion gerardi	0,1	0,0
Festuco-Puccinellietalia s.l.	0,1	0,0
Festuco-Puccinellietea s.l.	0,1	0,0
Puccinellio-Salicornea s.l.	0,1	0,0
Festuco-Bromea	0,0	0,0
Festuco-Brometea	0,0	0,0
Festucetalia valesiacae	0,0	0,0
Festucion rupicolae	0,1	0,0
Festucetalia valesiacae s.l.	0,1	0,0
Festuco-Brometea s.l.	0,1	0,0
Festuco-Bromea s.l.	0,1	0,0
Chenopodio-Scleranthea	0,1	0,0
Secalietea	0,6	0,5

2. táblázat folytatása: Karakterfajok csoportrészesedése (cs.r.) és csoporttömege (cs.t.)

2/2. táblázat	cs.r.	cs.t.
Chenopodietea	0,2	0,1
Artemisietea (incl. Artemisietalia et Arction lappae)	0,8	0,0
Galio-Urticetea (incl. Calystegietalia sepium)	0,0	0,0
Galio-Alliarion	1,6	0,2
Calystegion sepium	1,3	0,2
Galio-Urticetea s.l.	2,9	0,4
Bidentetea (incl. Bidentetalia)	0,3	0,0
Bidention tripartiti	0,1	0,0
Bidentetea s.l.	0,4	0,0
Plantaginetea (incl. Plantaginetalia majoris)	0,1	0,0
Epilobietea angustifolii (incl. Epilobietalia)	3,4	2,3
Epilobion angustifolii	0,5	0,4
Epilobietea angustifolii s.l.	3,9	2,7
Urtico-Sambucetea (incl. Sambucetalia et Sambuco-Salicion capreae)	0,6	1,5
Chenopodio-Scleranthea s.l.	9,6	5,2
Querco-Fagea	0,0	0,0
Salicetea purpureae (incl. Salicetalia purpureae)	2,2	0,7
Salicion albae	1,6	0,4
Salicenion albae-fragilis	0,0	0,0
Populenion nigro-albae	0,1	0,0
Salicion albae s.l.	1,7	0,4
Salicetea purpureae s.l.	3,9	1,1
Alnetea glutinosae (incl. Alnetalia glutinosae)	2,7	1,2
Querco-Fagetea	14,2	23,2
Fagetalia sylvaticae	27,4	34,4
Alnion incanae	8,1	4,3
Alnenion glutinosae-incanae	1,5	0,4
Ulmenion	0,7	0,6
Alnion incanae s.l.	10,3	5,3
Fagion sylvaticae	0,0	0,0
Eu-Fagenion	1,0	0,7
Carpinenion betuli	6,1	2,8
Tilio platyphyllae-Acerenion pseudoplatani	1,0	3,1
Fagion sylvaticae s.l.	8,1	6,6
Aremonio-Fagion	2,1	0,6
Fagetalia sylvaticae s.l.	47,9	46,9

2. táblázat folytatása: Karakterfajok csoportrészesedése (cs.r.) és csoporttömege (cs.t.)

2/3. táblázat	cs.r.	cs.t.
Quercetalia roboris	0,5	0,8
Deschampsio flexuosae-Fagion	0,0	0,0
Gentiano asclepiadeae-Fagenion	0,2	0,0
Deschampsio flexuosae-Fagion s.l.	0,2	0,0
Quercetalia roboris s.l.	0,7	0,8
Querco-Fagetea s.l.	62,8	70,9
Quercetea pubescentis-petraeae	8,6	11,8
Quercetalia cerridis	0,1	0,7
Quercion farnetto	0,4	0,1
Aceri tatarici-Quercion	0,1	0,0
Quercetalia cerridis s.l.	0,6	0,8
Prunetalia spinosae	0,2	0,0
Berberidion	0,1	0,7
Prunion fruticosae	0,2	0,0
Prunetalia spinosae s.l.	0,5	0,7
Quercetea pubescentis-petraeae s.l.	9,7	13,3
Querco-Fagea s.l.	79,1	86,5
Abieti-Piceea	0,0	0,0
Vaccinio-Piceetea	0,5	0,0
Pino-Quercetalia (incl. Pino-Quercion)	0,2	0,0
Vaccinio-Piceetea s.l.	0,7	0,0
Abieti-Piceea s.l.	0,7	0,0
Indifferens	2,7	2,6
Adventiva	3,5	5,1

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Climatic conditions and habitats in Belső-Somogy, Külső-Somogy and Zselic as vegetation-based landscape regions III. Temperature envelopes of mesic deciduous woodlands

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Salamon-Albert, É.: *Climatic conditions and habitats in Belső-Somogy, Külső-Somogy and Zselic as vegetation-based landscape regions III. Temperature envelopes of mesic deciduous woodlands.*
Abstract: In our study distribution response to climatic temperature of mesic deciduous woodlands (lowland pedunculate and sessile oak-hornbeam woodlands, beech woodlands) are discussed in the relation of vegetation based landscape regions of South Transdanubia, including Belső-Somogy, Külső-Somogy and Zselic. Selected bioclimatic variables are used to characterize and compare climate envelopes of the habitats by their occurrence. Gaussian probability curves were fitted for yearly, quarterly and some short time range or variability of temperature indexes, representing annual trends, seasonality and extreme or limiting environmental factors in order to generate more biologically meaningful variables. Mesic deciduous woodlands (K) are accurately integrated into the regional habitat envelope (Á-NÉR), according to multipeaks of temperature indices. Among temperature variables, mean annual temperature and maximum one of warmest month is not relevant for habitat differentiation in any way. Mean temperature variables (BIOCLIM-6, -8, -9, -11) are resulted a moderate shifting in the realised range of habitat envelopes in case of pedunculate oak-hornbeam woodlands (K1a) especially, but not in case of sessile oak hornbeam woodlands (K2) and beech woodlands (K5). Separation of pedunculate oak-hornbeam woodlands is well represented by the range and seasonal variables (BIOCLIM-2, -4, -7). This habitat type tolerates high range of diurnal temperature, but a lower one of yearly extremities, as seasonality and annual difference. The most significant temperature effect in the existence of pedunculate oak-hornbeam woodlands is high mean diurnal range as a temperature hardiness and high mean temperature of coldest quarter as a themal limitation.

Keywords: habitat distribution modelling (HDM), climate envelope, MÉTA database, mesic deciduous woodlands, landscape ecology

Introduction

Climate elements effecting presence and distribution of semi-natural habitats by a great extent is a hot topic of current ecological research, using e.g. bioclimatic envelope models for pattern analysis and predictions (Botkin et al. 2007). Climate-vegetation relations were widely analysed under different spatial scales connected with some vegetation classification according to bioms, continents, countries and regions in Europe or in the USA (Ozenda and Borel 2000, Hossel et al. 2003, Piovesan et al 2005,

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THOMPSON et al 2005, ATTORE et al. 2007, THOMPSON et al 2008). Requirements for small-scale studies are expressed by more and more authors continually (e.g. LINDNER et al. 2010), but the conclusions derived from scientific results based on the studies have to be applied with caution.

Quantifying distributions and determining which factors influence species or habitat range limits is an ongoing challenge for ecologists nowadays (GUISAN and THUILLER 2005, COLWELL and RANGEL 2009). The studies of how objects vary in their requirements for and tolerance of environmental factors has advanced, in part due to the quantification of the ecological niche, continued the complementary concepts of the environmental and the trophic niche, serve as a basis for assessing the ecological and biogeographical similarities and differences (CHASE and LEIBOLD 2003, SOBERÓN 2007). Numerous variety of measures have been used to quantify distribution characteristics leading to construct the environmental niches and analyse their overlap (e.g. SCHOENER 1970, COLWELL and FUTUYMA 1971, MAY and ARTHUR 1972, FITZPATRICK et al. 2008; PETERSON and NAKAZAWA 2008). In recent studies differences in niches that are quantified using observed occurrences of objects can reflect an unknown conjunction of the environmental status (SOBERÓN 2007, COLWELL and RANGEL 2009).

The subset of the environmental conditions that is actually occupied by the species corresponds to the realized niche (HUTCHINSON 1957). The environmental conditions resulting the realized environmental niche are described using e.g. a set of geographically referenced variables come from widely used, systematic databases of climatic parameters (HOSSELL et al. 2003, BEAUMONT et al. 2005, HIJMANS et al. 2005, ATTORRE et al. 2007, CZÚCZ et al. 2009). However, niche characteristics and overlap is estimated through the projection of those functions derived from SDMs across a landscape by any plant species or habitat as well, evaluating range of occurrence from environmental point of view. Novel analyses, e.g. connecting distribution models with other ecological phenomena, can provide novel capacities for understanding specific and general drivers of ranges in occurrence.

In this study our aims were to analyse 1) climate envelopes of mesic deciduous woodlands by mean and extreme short-, medium- and long-term climatic temperature variables, 2) range relations as climatic niche corresponding each other and to set of seminatural habitats, 3) detecting environmental variable(s) could be the most significant for the distribution by their temperature response.

Material and method

Study area

The study area is located in Külső-Somogy, Belső-Somogy and Zselic as three vegetation based landscape regions of South Transdanubia in Hungary, defined on the basis of present zonal or dominant extrazonal or edaphic vegetation (MOLNÁR Cs. et al. 2008). Elevation varies in a moderate range from lowlands (96 m a.s.l.) to hills (300 m a.s.l.), average altitude is 161 m a.s.l. Long-term annual temperature varies between 9.8 °C and 11.3 °C, the average was 10.8 °C (SALAMON-ALBERT et al. 2011). Studied regions are at the intersection of three climatic zone: from west as the atlantic, from east as the continental and from south as the mediterranean, that can influence the climatic surface. According to the main geobotanical division of Europe, the regions are fitted in the submontaneous oak-hornbeam woodlands as mesophilous woody habitats and thermophilous oak woodlands with open steppe oak woodlands and riparian vegetation (OZENDA and BOREL 2000).

BIOCLIM variables

Monthly, quarterly and yearly averages and extremities of temperature data as BIOCLIM-1 to -11 variables were used, that were measured at regional weather stations on local scales by the Hungarian Meteorological Service (http://vissycd.glia.hu/atlasz.html, MERSICH et al. 2001) and were integrated into the WorldClim database (http://www.worldclim.org/, HIJMANS et al. 2005). Corrected recalculation of the data was carried out by the Institute of Ecology of the Hungarian Academy of Sciences (CZÚCZ et al. 2007).

Temperature variables for the analyses are BIOCLIM-1 the annual mean temperature, BIOCLIM-2 the mean diurnal temperature range, BIOCLIM-4 the annual temperature seasonality calculated as the standard deviation of monthly means × 100, BIOCLIM-5 the maximum temperature of warmest month, BIOCLIM-6 the minimum temperature of coldest month, BIOCLIM-7 the temperature of annual range, BIOCLIM-8 the mean temperature of wettest quarter, BIOCLIM-9 the mean temperature of driest quarter, and BIOCLIM-11 the mean temperature of coldest quarter. Annual data refer to monthly climate measurements from January to December, wettest quarter means data from June to August, driest quarter means data from January to March, warmest quarter means data from June to August, coldest quarter means data from December to February as the periods of three months, as ¼ of a year.

Habitats of mesic deciduous woodlands

MÉTA project (2002-2006) was a systematic habitat mapping of the Hungarian semi-natural vegetation on landscape scale integrated with spatial and geographical information (BÖLÖNI et al 2007, MOLNÁR et al 2007, HORVÁTH et al. 2008). Field data collecting were carried out at hexagon scale by high resolution (35 hectares per each) as basic units, and they were integrated into quadratic scale for landscape mapping (35 km^2 per each), both added to the MÉTA tables and databases (HORVÁTH and POLGÁR 2008). In our study mesophilous woody habitat types connected with temperature variables were assigned to finer spatial scale for 16300 hexagons of 163 MÉTA quadrats of the regions.

In total 5 MÉTA habitat types of mesophilous woodlands (K as the associated habitat group) were identified in the vegetation based regions, including K1a the lowland pedunculate oak-hornbeam woodlands, K2 the sessile oak-hornbeam woodlands, K5 the beech woodlands, K7a the acidofrequent beech woodlands and K7b the acidofrequent oak-hornbeam woodlands (MOLNÁR et al. 2008, SALAMON-ALBERT et al. 2008, 2010, 2011). In our study we focused on significant mesic woodlands as K1a (n=1792), K2 (n=2042), K5 (n=926) and associated habitat group of K (n=3848), using the binary data of occurrence for the analyses.

Sessile oak hornbeam woodlands (K2) are the most abundant in the regions as well as in Hungary. They are mostly occurred on submontane and colline exposition, but missing from lowlands, usually on deep soils, dominated by *Quercus petraea, Carpinus betulus* and/or *Fagus sylvatica*. In Belső-Somogy, this habitat type is replaced by lowland pedunculate oak-hornbeam forests, according to geographical features. It is connected to cool-humid climate suitable for mesic forests. It occurs in all type of (but mainly on solid) bedrock. In hilly regions it can rather be found on loess or loess-like sediments, but missing on sand, and occurs on clay, where it forms mosaic with lowland oak-hornbeam woodlands.

Pedunculate oak-hornbeam woodlands (K1a) are the second in abundance among mesic woodland habitat types in the regions. Shadowed and mesic forests of lowlands and hilly regions, with *Quercus robur* and *Carpinus betulus* in the tree layer. The centre of the distribution is in the western part of Transdanubia: with greatest extension in Belső-Somogy (14000 ha), and connected to this area, in Dráva-sík (6000 ha). Apart

from Dráva-sík, it can be found only at the edges of Alföld, with the greatest number in Szatmár-Beregi-sík (1500 ha). It occurs on incoherent sedimentary rocks, especially on sand and clay, mainly on the humid parts of lowlands and hilly regions. On lowlands, it appears typically in high floodplains, whereas in river and stream valleys in the hilly regions of Hungary. This habitat type frequently occurs together and forms mosaic with sessile oak-hornbeam woodlands (K2).

Beech woodlands (K5) are high growing, closed mesic forests, connected to cool and humid climate with beech monodominance (*Fagus sylvatica*). The habitats occur with the greatest extension in the Északi-középhegység (45000 ha). In certain parts of Transdanubia 12500 ha, with larger extension in Zselic and Mecsek, and sporadically in Külső- and Belső-Somogy. Under less favourable abiotic environment (too dry) and/or under strong human impact the habitat is gradually reducing (e.g. Külső- and Belső-Somogy).

Habitat nomenclature is by MOLNÁR ZS. et al (2008), vegetation characterization is by BÖLÖNI et al. (2008).

Data analyses

By the set of temperature variables regional climatic envelopes are reported for semi-natural habitats (Á-NÉR), and types of mesic deciduous woodlands disposing statistically appropriate plot number (K, K1a, K2, K5). In the first step, scatterplots were constructed from the relative distribution (%) on total area covered by any semi-natural vegetation as the regional habitat envelope (Á-NÉR) and on woodland types as the habitat envelope according to temperature variables. Data originated from the associated dataset of habitat occurrence and climatic variables, were sorted for the analyses representing all of the sampling points (MÉTA hexagons). In second step, area version of Gaussian function as a nonlinear single or multipeak analysis was executed on each scatterplot, computing Levenberg-Marquardt algorithm as an iterative procedure by Origin 6.0. Area based Gaussian model describes a bell-shaped curve like a normal probability distribution function, ecologically defined as realized niche by temperature index. Temperature weighted Gaussian curves were statistically compared by a one-way analysis of variance (ANOVA). Pairwise significant differences were counted if $p<0.05$. Temperature sensitivity of a habitat by a given bioclimatic variable was interpreted as significant difference among variabilities in the temperature envelopes (e.g. K1a to Á-NÉR by BIOCLIM-2, see Table 2). Overlapping distributions without any significant difference are interpreted as a climate or habitat gradient, curve that has significant difference to any other are defined as a regional climate or habitat functional group.

Results

Climate envelope is a realized range of abiotic environmental variables that could effect pattern and distribution of habitat types potentially in geographical or natural landscape areas. Basic statistics of 9 calculated bioclimatic variables of temperature, as minimum, maximum, mean values and the range at several scales are given for the studied regions (Table 1). Referring to general temperature relations of semi-natural habitats the most relevant index is the mean annual temperature (BIOCLIM-1). It varies between 9.8 and 11.3 °C, with the range of 1.5 °C in the regions. Range of variable is differed among habitat types, with the lowest value by pedunculate oak-hornbeam woodlands (K1a) and beech woodlands (K5) opposite to sessile oak hornbeam woodlands (K2) that

Table 1: Basic statistics of temperature envelopes for semi-natural habitats (Á-NÉR), mesic deciduous woodlands (K), lowland pedunculate oak-hornbeam woodlands (K1a), sessile oak-hornbeam woodlands (K2), and beech woodlands (K5) in the landscape regions

Á-NÉR		range	min	mean	max	std
BIOCLIM-1	Mean annual temperature	1.5	9.8	10.7	11.3	0.2
BIOCLIM-2	Mean diurnal temperature range	0.7	9.0	9.4	9.7	0.2
BIOCLIM-4	Temperature seasonality of the year	50	771	796	821	12
BIOCLIM-5	Maximum temperature of warmest month	1.8	25.8	26.9	27.6	0.3
BIOCLIM-6	Minimum temperature of coldest month	1.5	-4.7	-4.0	-3.2	0.2
BIOCLIM-7	Temperature annual range	1.1	30.4	30.9	31.5	0.2
BIOCLIM-8	Mean temperature of wettest quarter	2.7	17.9	19.4	20.6	0.7
BIOCLIM-9	Mean temperature of driest quarter	1.7	1.2	2.1	2.9	0.3
BIOCLIM-11	Mean temperature of coldest quarter	1.7	-0.5	0.4	1.2	0.3

K		range	min	mean	max	std
BIOCLIM-1	Mean annual temperature	1.4	9.8	10.7	11.3	0.2
BIOCLIM-2	Mean diurnal temperature range	0.7	9.0	9.4	9.7	0.2
BIOCLIM-4	Temperature seasonality of the year	50	771	795	821	11
BIOCLIM-5	Maximum temperature of warmest month	1.8	25.8	26.8	27.6	0.3
BIOCLIM-6	Minimum temperature of coldest month	1.4	-4.7	-4.0	-3.3	0.2
BIOCLIM-7	Temperature annual range	1.1	30.4	30.8	31.5	0.2
BIOCLIM-8	Mean temperature of wettest quarter	2.6	17.9	19.3	20.5	0.7
BIOCLIM-9	Mean temperature of driest quarter	1.6	1.2	2.1	2.8	0.3
BIOCLIM-11	Mean temperature of coldest quarter	1.5	-0.4	0.4	1.1	0.3

K1a		range	min	mean	max	std
BIOCLIM-1	Mean annual temperature	1.1	10.0	10.7	11.1	0.2
BIOCLIM-2	Mean diurnal temperature range	0.6	9.1	9.5	9.7	0.1
BIOCLIM-4	Temperature seasonality of the year	39	771	786	810	9
BIOCLIM-5	Maximum temperature of warmest month	1.4	25.9	26.8	27.3	0.2
BIOCLIM-6	Minimum temperature of coldest month	1.3	-4.6	-3.9	-3.3	0.2
BIOCLIM-7	Temperature annual range	0.8	30.4	30.7	31.2	0.1
BIOCLIM-8	Mean temperature of wettest quarter	2.3	18.1	19.7	20.4	0.5
BIOCLIM-9	Mean temperature of driest quarter	1.5	1.3	2.2	2.8	0.3
BIOCLIM-11	Mean temperature of coldest quarter	1.4	-0.3	0.5	1.1	0.3

K2		range	min	mean	max	std
BIOCLIM-1	Mean annual temperature	1.4	9.8	10.6	11.3	0.3
BIOCLIM-2	Mean diurnal temperature range	0.6	9.0	9.3	9.6	0.1
BIOCLIM-4	Temperature seasonality of the year	47	774	802	821	7
BIOCLIM-5	Maximum temperature of warmest month	1.8	25.8	26.8	27.6	0.3
BIOCLIM-6	Minimum temperature of coldest month	1.1	-4.7	-4.1	-3.6	0.2
BIOCLIM-7	Temperature annual range	1.1	30.4	30.9	31.5	0.2
BIOCLIM-8	Mean temperature of wettest quarter	2.6	17.9	18.9	20.5	0.6
BIOCLIM-9	Mean temperature of driest quarter	1.3	1.2	2.0	2.5	0.2
BIOCLIM-11	Mean temperature of coldest quarter	1.2	-0.4	0.2	0.8	0.2

K5		range	min	mean	max	std
BIOCLIM-1	Mean annual temperature	1.1	10.1	10.6	11.2	0.2
BIOCLIM-2	Mean diurnal temperature range	0.5	9.1	9.3	9.6	0.1
BIOCLIM-4	Temperature seasonality of the year	43	778	800	821	6
BIOCLIM-5	Maximum temperature of warmest month	1.4	26.1	26.8	27.5	0.3
BIOCLIM-6	Minimum temperature of coldest month	0.9	-4.6	-4.1	-3.7	0.2
BIOCLIM-7	Temperature annual range	1.1	30.4	30.9	31.5	0.2
BIOCLIM-8	Mean temperature of wettest quarter	2.4	17.9	18.6	20.3	0.5
BIOCLIM-9	Mean temperature of driest quarter	1.1	1.4	2.0	2.5	0.2
BIOCLIM-11	Mean temperature of coldest quarter	1.1	-0.3	0.2	0.8	0.2

has the highest one. Bioclimatic indeces according to a mean of a short period (e.g. a day, a month or a quarter) or indicating environmental extremities could give a climate limitation for vegetation distribution. Mean diurnal temperature range (BIOCLIM-2) are quite similar among the woodland types as well as the semi-natural habitats, but the minimum, maximum and mean values significantly differs by mesic deciduous woodland types, with the highest mean in pedunculate oak-hornbeam woodlands (K1a). Temperature seasonality of the year (BIOCLIM-4) provides the best range differentiation among the habitats. Pedunculate oak-hornbeam woodlands (K1a) have the narrowest seasonality range, beech woodlands (K5) have the range of medium size and sessile oak hornbeam woodlands (K2) have the highest value of it. BIOCLIM-5 the maximum temperature of warmest month has the widest range in sessile oak hornbeam woodlands (K2), the narrowest one in pedunculate oak-hornbeam woodlands (K1a) and beech woodlands (K5). Among ranges in minimum temperature of coldest month (BIOCLIM-6), the highest one is observed in pedunculate oak-hornbeam woodlands (K1a), the medium sized one is realized by sessile oak hornbeam woodlands (K2) and the narrowest range occurs in the beech woodlands (K5). BIOCLIM-7 the temperature annual range differs pedunculate oak-hornbeam woodlands (K1a) by a lower value from sessile oak hornbeam woodlands (K2) and beech woodlands (K5), that show a higher and similar one. By BIOCLIM-8 the mean temperature of wettest quarter, sessile oak hornbeam woodlands (K2) display the highest value of it, and pedunculate oak-hornbeam woodlands (K1a) and beech woodlands (K5) have a lower value of range. BIOCLIM-9 the mean temperature of driest quarter, highest range is represented in pedunculate oak-hornbeam woodlands (K1a), the medium sized one is realized in sessile oak hornbeam woodlands (K2) and the narrowest range occurs in the beech woodlands (K5). In case of mean temperature of coldest quarter (BIOCLIM-11), range order of the mesic deciduous woodland habitats is similar to that of mean temperature of driest quarter, because of the variable superimposition.

According to ranges and means of analysed variables in mesic deciduous woodland habitats, functional groups of temperature responses can be defined. Similarity in that of pedunculate oak-hornbeam woodlands (K1a) with beech woodlands (K5) but dissimilarity of sessile oak hornbeam woodlands (K2) was established by BIOCLIM-1, -5 and -8. Gradual change among the habitats was detected by BIOCLIM-6, -9 and -11 from pedunculate oak-hornbeam woodlands (K1a) through sessile oak hornbeam woodlands (K2) to beech woodlands (K5) by descending order but by BIOCLIM-8 by ascending order. In order of sessile oak hornbeam woodlands (K2) through beech woodlands (K5) to pedunculate oak-hornbeam woodlands (K1a) narrowing ranges are detected by temperature seasonality of the year (BIOCLIM-4).

There was a strong superimposition between the summarized temperature envelope of semi-natural habitats (Á-NÉR) and mesic deciduous woodlands (K) as it was verified by the absence of any significant difference (Fig 1, Table 1 and 2). Differences are anticipated among peak distribution of habitat types and/or to envelopes of semi-natural habitats. Results are introduced as the similarity or dissimilarity to semi-natural habitat distribution as the realized regional temperature envelopes.

Among temperature variables, all of them show a continuous distribution as a summarized temperature niche characterized with one, two, three or four Gaussian peaks per curves. BIOCLIM-1 the mean annual temperature have no significant difference in any habitats as well as the Á-NÉR distribution. Highest proportion of habitat envelopes occur at medium values of the range. BIOCLIM-2 the mean diurnal temperature presents two-peaked distributions, habitat envelopes are differentiated in the range with significant differences by sessile oak hornbeam woodlands (K2) and beech woodlands (K5) at

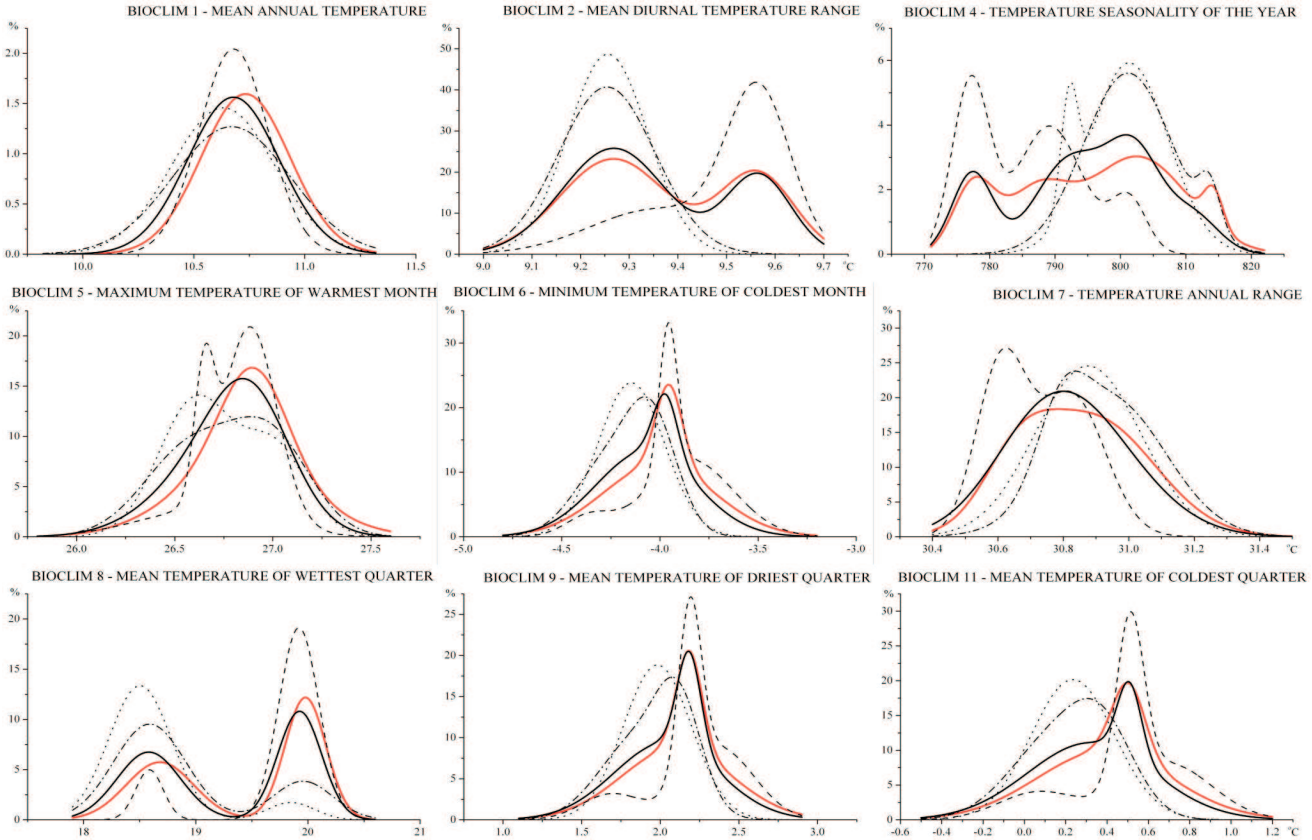

Fig 1: Summarized temperature envelopes of mesic deciduous woodlands on relative occurrence in the landscape regions. Signs: □ □ semi-natural habitats (Á-NÉR), □ □ mesic deciduous woodlands (K), – – lowland pedunculate oak-hornbeam woodlands (K1a), –·– sessile oak-hornbeam woodlands (K2), ··· beech woodlands (K5).

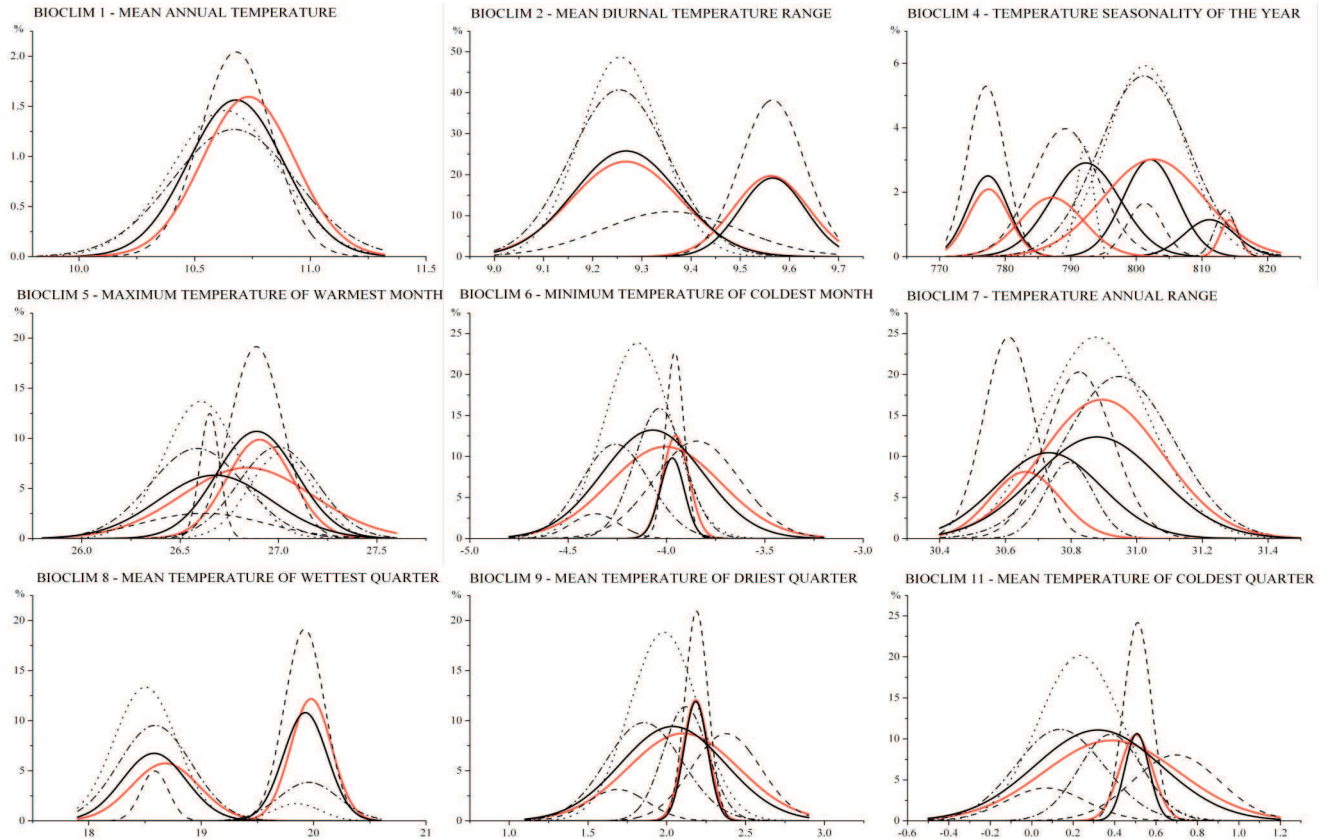

Fig 2: Multipeak temperature envelopes of mesic deciduous woodlands on relative occurrence in the landscape regions. Signs: □ □ semi-natural habitats (Á-NÉR), □ □ mesic deciduous woodlands (K), – – lowland pedunculate oak-hornbeam woodlands (K1a), –·– sessile oak-hornbeam woodlands (K2), ··· beech woodlands (K5).

lower values to pedunculate oak-hornbeam woodlands (K1a) at higher values as well as to semi-natural habitats (Á-NÉR). BIOCLIM-4 the temperature seasonality of the year resulted shifting in distribution with no significant differences among habitat envelopes. Pedunculate oak-hornbeam woodlands (K1a) is positioned at lower values, sessile oak hornbeam woodlands (K2) and beech woodlands (K5) are done at higher values of the range. BIOCLIM-5 the maximum temperature of warmest month, show a continuous regional envelope, but two-peaked habitat envelopes without any significant differences to each other. BIOCLIM-6 the minimum temperature of coldest month has three-peaked distribution without any significant differences in summarized curves. Sessile oak hornbeam woodlands (K2) and beech woodlands (K5) are positioned at lower values, pedunculate oak-hornbeam woodlands (K1a) are done at medium and higher values of the range. BIOCLIM-7 the temperature annual range, are similar to previous variable, but with two hardly overlapping peaks by Á-NÉR and K habitats also. Among mesic woodland habitat types have two-peaked distribution positioning at the medium values of the range, with the exception of pedunculate oak-hornbeam woodlands (K1a) at the lower values of the range. BIOCLIM-8 the mean temperature of wettest quarter, has two-peaked splitted curve at all of distribution. Habitat envelopes are fitted by and imbalanced relation, sessile oak hornbeam woodlands (K2) and beech woodlands (K5) are prevailed at the lower values, pedunculate oak-hornbeam woodlands (K1a) are done at the higher ones. BIOCLIM-9 the mean temperature of driest quarter present a two-peaked ditribution without any significant difference in envelopes to each other. Pedunculate oak-hornbeam woodlands (K1a) are positioned at a little bit higher values than sessile oak hornbeam woodlands (K2) and beech woodlands (K5) int he range. BIOCLIM-11 the mean temperature of coldest quarter has a similar distribution to the previous, but significant difference is resulted among woodland habitats. Pedunculate oak-hornbeam woodlands (K1a) show a characteristic curve at medium and high values opposite to sessile oak hornbeam woodlands (K2) and beech woodlands (K5) that are positioned at lower values, but not to semi-natural habitat envelope (Á-NÉR).

Table 2: Relations of summarized temperature envelopes for semi-natural habitats (Á-NÉR), mesic deciduous woodlands (K), lowland pedunculate oak-hornbeam woodlands (K1a), sessile oak-hornbeam woodlands (K2) and beech woodlands (K5) in the landscape regions. Significant differences are signed by level of probability. BIOCLIM-2 the mean diurnal temperature range, BIOCLIM-11 the mean temperature of coldest quarter

BIOCLIM-2	Á-NÉR	K	K1a	K2
Á-NÉR				
K	ns			
K1a	ns	ns		
K2	p<0.001	p<0.001	p<0.001	
K5	p<0.001	p<0.001	p<0.001	ns

BIOCLIM-11	Á-NÉR	K	K1a	K2
Á-NÉR				
K	ns			
K1a	ns	ns		
K2	ns	ns	p<0.001	
K5	ns	ns	p<0.001	ns

Discussion

Previous studies suggest, that temperature variables could have a less significant role in the existence of woody habitat types in the landscape region, opposite to precipitation ones (SALAMON-ALBERT et al. 2010a,b, 2011). According to our current results, some temperature variable was investigated forming significant difference to semi-natural regional envelope or among some type of mesic deciduous woodlands. In spite of relative narrow ranges of temperature variables, whole multipeak distributions were resulted for the regions, but the exception of BIOCLIM-3 the isothermality as the ratio of mean diurnal range/temperature annual range.

Among temperature variables formulating range and seasonality, BIOCLIM-2 the mean diurnal temperature range resulted less complicated but significantly different habitat envelopes: sessile oak hornbeam woodlands (K2) and beech woodlands (K5) occur at low, pedunculate oak-hornbeam woodlands (K1a) does at medium and high values. BIOCLIM-4 resulted the most complicated regional and habitat envelopes containing four Gaussian multipeaks by the regional habitats as well as in the woodland types. Along yearly temperature seasonality scale habitats are placed in ascending order: pedunculate oak-hornbeam woodlands (K1a) are positioned at low and medium, beech woodlands (K5) at medium and sessile oak hornbeam woodlands (K2) at medium to high values of seasonality. The third member of temperature variety, BIOCLIM-7 show a similar shift of mesic woodlands to the temperature seasonality of the year by pedunculate oak-hornbeam woodlands (K1a) appear at lowest values, sessile oak hornbeam woodlands (K2) and beech woodlands (K5) does at medium and highest values of the range. Variables representing absolute minimum and maximum values, mesic woodland habitats are weakly diffrentiated by BIOCLIM-5 and BIOCLIM-6. There is a moderate shifting in pedunculate oak-hornbeam woodlands (K1a) to the higher values by the minimum temperature of coldest month additionally. Among mean variables of temperature, all of mesic woodland habitats are distributed identical to semi-natural woodland habitats by BIOCLIM-1 the mean annual temperature and BIOCLIM-8 the mean temperature of wettest quarter. By BIOCLIM-9 the mean temperature of driest quarter and BIOCLIM-11 the mean temperature of coldest quarter, pedunculate oak-hornbeam woodlands (K1a) are shifted into the higher values of the range, and significantly differed from by sessile oak hornbeam woodlands (K2) and beech woodlands (K5) by the latter one.

Evaluating temperature preference described by habitat envelope, BIOCLIM-1 and BIOCLIM-5 is not relevant for habitat differentiation in any way. Various patterns represented by the multipeak ratios in habitat distribution is represented by BIOCLIM-8 the mean temperature of wettest quarter. By mean temperature variables a moderate shifting in habitat envelope of pedunculate oak-hornbeam woodlands (K1a) are indicated, sessile oak hornbeam woodlands (K2) and beech woodlands (K5) are differential from it but similar to each other. The most significant differentiation was resulted by range and seasonality variables (BIOCLIM-2, -4, -7), describing pedunculate oak-hornbeam woodlands (K1a) as a highly separated habitat type with higher diurnal but lower seasonal and yearly values in temperature envelopes.

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Eco-faunistic study on the Collembola fauna in the Vasvár-Nagymákfa area (Őrség, Western Hungary)

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Winkler, D. & Traser, Gy. N.: *Eco-faunistic study on the Collembola fauna in the Vasvár-Nagymákfa area (Őrség, Western Hungary).*

Abstract: In the course of the 6th Hungarian Biodiversity Day in 2010 the Collembola fauna was studied in the region of Vasvár-Nagymákfa in four different habitats (forests and meadows). During the survey a total of 5557 specimens belonging to 67 species were collected, 49 of them are new to the fauna of Őrség peaking now a total of 103 Collembola species in this region of Western Hungary. Two species, namely *Tetracanthella pericarpatica* Kaprus & Tsalan, 2009 and *Arrhopalites acanthophthalmus* Gisin, 1958 proved to be new to the Hungarian fauna. A particular *Pseudosinella* species (*P.* cf. *horaki*) is also described and illustrated.

Keywords: soil fauna diversity, Collembola communities, Hungarian Biodiversity Day, *Tetracanthella pericarpatica, Arrhopalites acanthophthalmus, Pseudosinella* cf. *horaki*

Introduction

The soil is a unique habitat that supports rich and diverse life assemblages of living organisms (Giller et al. 1997), including springtails (Collembola) which substantially contribute to the decomposition of organic matter. They are the most abundant hexapods on Earth. One litre of healthy soil contain an average of 1000 Collembola specimens (Hopkin 1994).

The United Nations has declared 2010 to be the International Year of Biodiversity and soil biodiversity came into the spotlight for the first time (Jeffery et al. 2010). On the occasion of the 6th Hungarian Biodiversity Day held on 5 June 2010 in the area of Vasvár-Nagymákfa and surroundings (Őrség National Park), the survey of the collembolan fauna was also carried out. This paper presents a comparative study of Collembola communities of the most typical habitats for the area.

Material and Methods

Study area

The study sites are situated along the Csörnöc river, between 47°01'35" and 47°02'43" N and 16°43'54"E and 16°45'14" near Vasvár-Nagymákfa, Vas county, Hungary. Sampling was conducted in four different habitats including both forests and open areas

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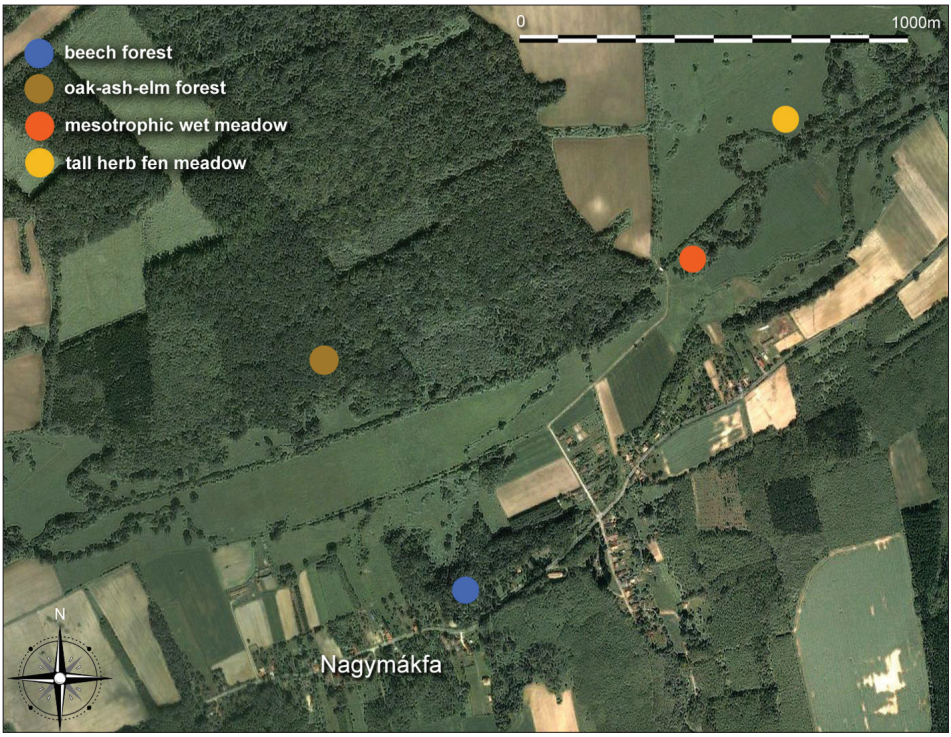

Fig. 1: Study sites in Vasvár-Nagymákfa (Google Earth)

(Fig 1).

BF - beech forest (47°1'35.15"N; 16°44'8.32"E, 202 m asl) with beech (*Fagus sylvatica*) monodominace. Scattered trees of European Alder (*Alnus glutinosa*) and Wild Cherry (*Cerasus avium*) are also present.

OAEF – lowland riverine oak-ash-elm forest (47°2'1.55"N; 16°43'54.40"E, 188 m asl). Beside the Pedunculate Oak (*Quercus robur*) and European Ash (*Fraxinus excelsior*) several riverine forest species constitute the tree layer.

WM – lowland mesotrophic wet meadow Á-NÉR: D34 (47° 2'23.20"N, 16°44'51.09"E, 178 m asl) with typical dominant grass species (e.g. *Agrostis alba, Deschampsia caespitosa, Festuca pratensis, Poa pratensis*) and numerous protected plant species.

THFM – tall herb fen meadow association (47° 2'22.77"N; 16°44'54.19"E, 178 m asl), with characteristic species like *Angelica sylvestris, Cirsium oleraceum, Filipendula ulmaria*. The presence of *Solidago* spp. is prominent.

Sampling, extraction and taxonomic identification

Soil cores samples of 100 cm^3 were taken from the 0 to 5 cm layer. A total of 37 samples were obtained from the three different habitats ranging from 8 to 12 samples per site. Extraction of Collembola specimens from the soil was carried with the help of a modified Tullgren's apparatus at room temperature (BALOGH 1958). Supplementary sampling was done in the beech forest and in the wet meadow using suction method to detect the species mainly present aboveground with more efficiency. Specimens were collected in 70% ethanol and separated under a binocular microscope. The Collembola

species have been stored in the archives of the authors. Springtails were identified at the species level according to GISIN (1960), STACH (1960, 1963), MASSOUD (1967), DEHARVENG (1982), FJELLBERG (1980, 1998), BABENKO et al. (1994), ZIMDARS & DUNGER (1994), WEINER (1996), JORDANA et al. (1997), POMORSKI (1998), BRETFELD (1999), POTAPOW (2001) and THIBAUD et al. (2004). Taxonomic classification is primarily based on the annotated checklist of the Hungarian Collembola fauna (DÁNYI & TRASER 2008).

Abbrevations used in the descriptions: Ant. = Antennal segments; Abd. I–VI = abdominal tergites.

Data analysis

Average abundance values (specimens/100 cm^3) for each species per habitat type are given. Data obtained using the suction sampling method were not included in the quantitative analysis, only grades of abundance (BERNDT & WINKEL 1983) were given for the additional species.

The attributes of Collembola communities in the sampled habitats are presented via comparison of species richness, ecological composition, abundance and diversity indices. On species level, we used the measure 'habitat amplitude' (HA), according to the formula of SIMPSON (1949), which reflects the relative abundance of each Collembola species in the sampled habitats. Rank abundance curves were used to examine general trends in the Collembola dominance structure and abundance for each habitat type. Dominance structure was quantified by using community dominance index (CDI), which reflects how large a proportion of the total species present (in terms of numbers of individuals) is made up of the two most abundant species. Two measures of species α diversity were calculated for each habitat: the Shannon index ($H' = -\sum p_i \ln p_i$) and equitability ($J = H' / \ln S$ - where S is species richness). Community structure comparison between the different habitats was estimated using single linkage cluster analysis based on the Jaccard and Bray-Curtis similarity indices.

Results and Discussion

Faunistical results

A total of 5557 specimens representing 14 families and belonging to 67 species (Table 1) were collected and identified. Up to the present time 54 Collembola species have been reported from the Őrség area (TRASER 1995). Out of the species collected in Vasvár-Nagymákfa, 49 are new to the fauna of Őrség peaked at 103 species recently. Two species, namely *Tetracanthella pericarpatica* Kaprus & Tsalan, 2009 (Isotomidae) and *Arrhopalites acanthophthalmus* Gisin, 1958 (Arrhopalitidae) proved to be new to the Hungarian fauna, therefore some detailed information and illustrations are given below. Furthermore, a rare and interesting species, *Pseudosinella* cf. *horaki* Rusek, 1985 (Entomobryidae) is also illustrated and described.

Tetracanthella pericarpatica Kaprus & Tsalan, 2009 (Fig. 2) was formerly known only from the Transcarpathian Lowland and Roztochchia Hill, Ukraine (KAPRUS & TSALAN 2009). A total of 65 specimens were collected mainly from the lowland riverine oak-ash-elm forest, but it also occurred, in lower abundance, in the tall herb fen meadow association.

Fig. 2: ***Tetracanthella pericarpatica*** **(Photo: D. Winkler)**

Description: A predominantly bluish-black species (the specimen on Fig. 2 is marbled due to the preparation). The very strong, amber coloured and bent anal spines are clearly visible in Fig. 2. Detailed description has already been given by WINKLER et al. (2011) with some corrections and additions to the original description (KAPRUS & TSALAN 2009).

Arrhopalites acanthophthalmus Gisin, 1958 (Figs 3-5) is known from Romania, Austria, France and Spain, while its presence in Germany is doubtful (BRETFELD 1999, BETSCH & FJELLBERG 2011). Like the latter species, *A. acanthophthalmus* was also found in the oak-ash-elm forest as well as in the tall herb fen meadow habitat.

Description: A small, white-reddish species (Fig. 3) with unpigmented eye. Ant. IV not divided, while Ant. III strongly swollen at the base. Head with 13 spines (Fig. 4). Retinaculum with 1 seta. Anal appendage rod-like, slightly curved and pointed, slender, seta-like (Fig. 5). Circumanal setae are strong but not winged. Dens with E1-4 and I1-2 spines. Mucronal edge both serrated, tip spherical.

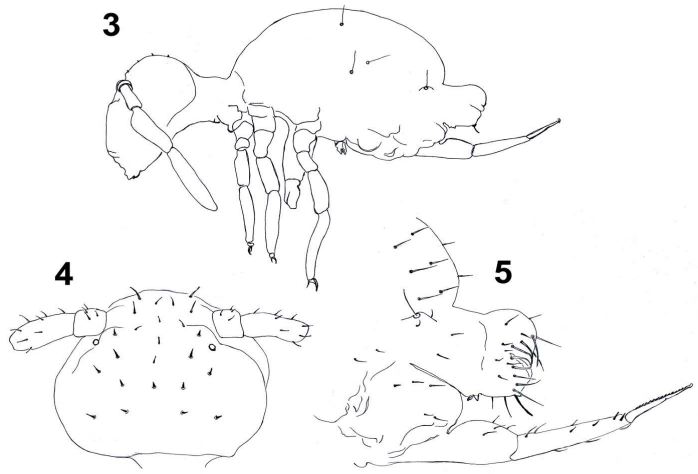

Fig. 3-5: ***Arrhopalites acanthophtalamus:*** **3. Habitus; 4. Head with the cephalic spines; 5. Abd. V-VI. - dens and mucro**

Pseudosinella* cf. *horaki Rusek, 1985 (Fig. 6) was described from Moravia, Czech Republik (RUSEK 1985) and later it was also found in Slovakia, Hungary and Moldova (BEDOS & FJELLBERG 2011). In the study area Vasvár-Nagymákfa, this species was collected in the beech forest and, with lower abundance, in the oak-ash-elm forest.

Description: Body length max. 1.2 mm (without head nor furca). Colour pale gray. The species belongs to the *P. wahlgreni* group characterized by 5+5 ommatidia. Eyepatch is dark. Antenna without scales, antenna-head ratio 1.2. Ant. IV without apical bulb. Antenna base with two pseudopori. Labrum and frontoclypeal area as on Fig. 7. Praelabral setae ciliated, labral setae smooth, in 4/554 arrangement. Maxillary outer lobe with 3 sublobal hairs. Lateral process on the papilla E slightly curved, not reaching the top of the papilla (Fig. 8). Formula of the labial triangle (=basomedial setae) $M_1M_2rEL_1L_2$: r smooth and shortened, only about 1/3-lenght of the other setae. The 'a' setae in the anterior row are smooth. Along the labial ventral grove 4+4 ciliated setae. Dorsal cephalic macrochaetae $R_0R_{1s}R_2$ (Fig. 9), S and T absent. Body dorsal macrochaetae 00/0101+2. Abd. II chaetotaxy (Fig. 10) $paBq_1q_2$ (notation after GISIN 1967). Abd. III chaetotaxy as on Fig. 11. Chaetotaxy and trichobotrial complex of Abd. IV as in Figs 12 and 13, macrochaeta 's' absent.

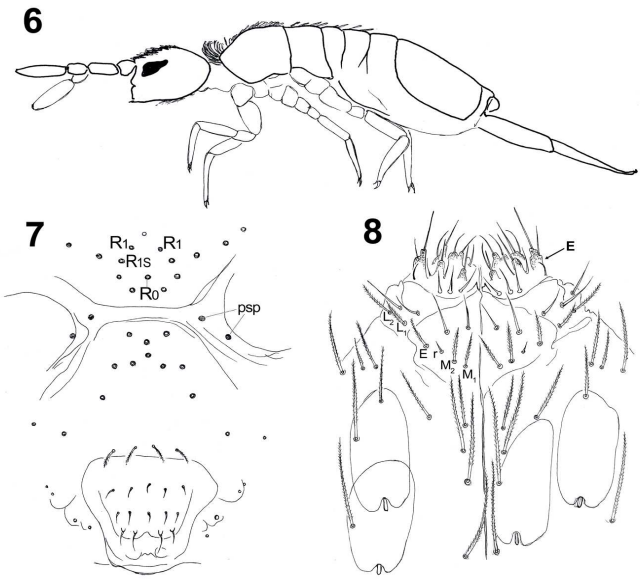

Fig. 6-8: *Pseudosinella* cf. *horaki*: 6. Habitus; 7. Mouthparts and frontoclypeal area; 8. Labial triangle and labial papillae

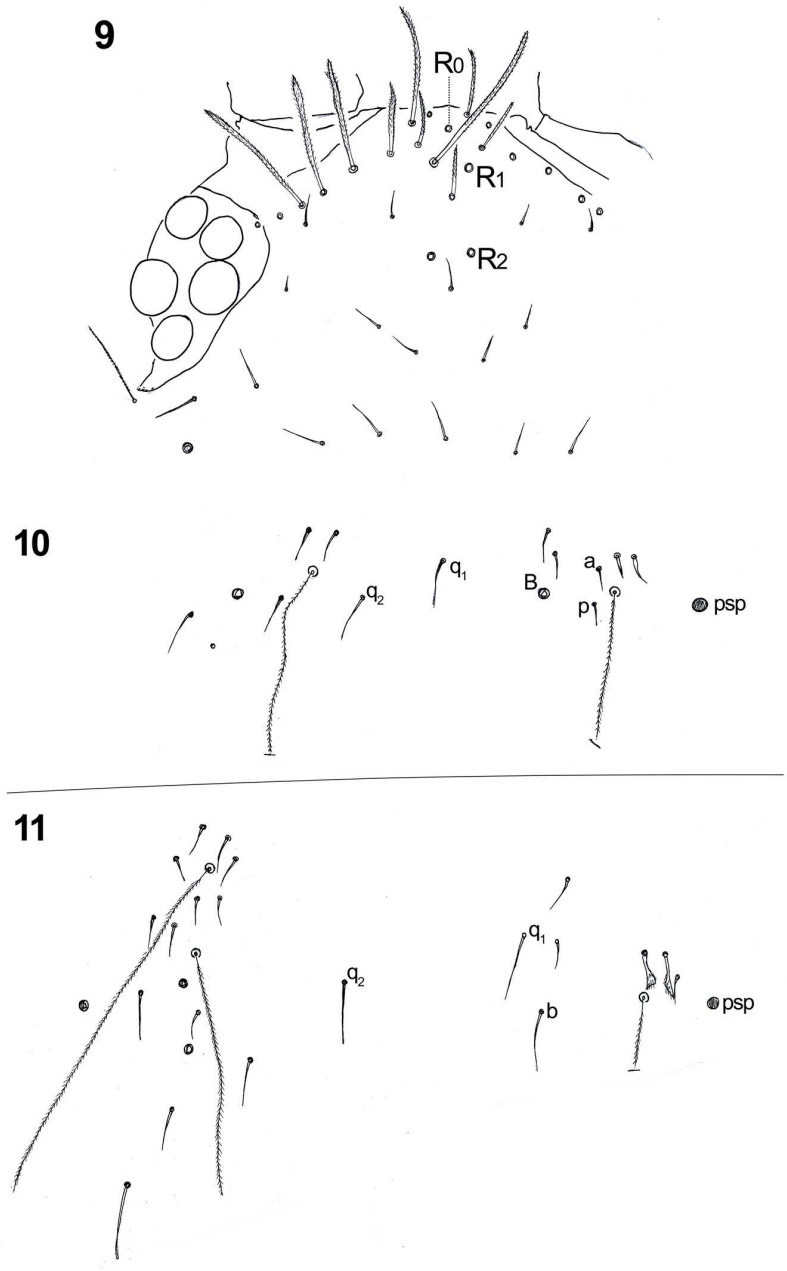

Fig. 9-11: *Pseudosinella* cf. *horaki*: 9. dorsal head chaetotaxy; 10. Abd. II complete chaetotaxy (left side); 11. Abd. III complete chaetotaxy (left side)

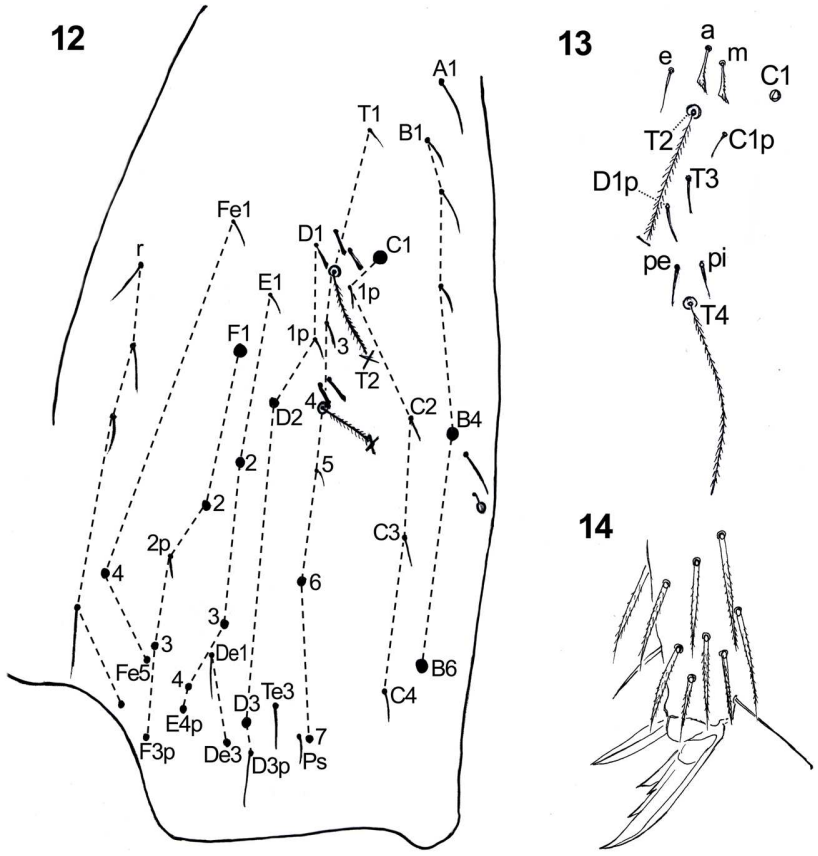

Fig. 12-14: *Pseudosinella* cf. *horaki*: 12. Abd. IV complete chaetotaxy; 13. Abd. IV trichobotrial complex; 14. Claw and empodium (leg III)

Claws with paired proximal teeth (Fig 14). The inner proximal unpaired tooth reaching to 65% of length of ventral lamella. Manubrial plate with 2+2 setae on both sides of the 2 pseudopori.

Remarks: our species shows some differences compared with *P. horaki*, such as the smooth 'r' seta in the labium. Nevertheless, not having seen any specimens of *P. horaki* for comparison, we decided to consider it as *P.* cf. *horaki*.

Collembola community analysis

Average abundance and habitat amplitude of the occurred species are presented in Table 1.

Table 1: Average abundance (specimens/100 cm^3) and abundance grade (based on the suction sampling method) of Collembola species in the studied habitat and species habitat amplitude according to Simpson's formula

(BF – beech forest, OAEF – oak-ash-elm forest, WM – mesotrophic wet meadow, THFM – tall herb fen meadow; HA – habitat amplitude; + sporadic occurrence; ++ scattered occurence ; +++ occurence in high abundance)

	BF	OAEF	WM	THFM	*HA*
Hypogastruridae					
Ceratophysella denticulata (Bagnall, 1941)	-	15.25	-	-	1.00
Ceratophysella granulata Stach, 1949	0.08	-	-	-	1.00
Hypogastrura sp. juv	-	-	1.11	-	1.00
Willemia virae Kaprus, 1997	-	0.38	-	-	1.00
Xenylla boerneri Axelson, 1905	18.58	-	-	-	1.00
Neanuridae					
Friesea truncata Cassagnau, 1958	-	0.38	-	3.13	1.24
Bilobella braunerae Deharveng, 1981	0.50	-	-	-	1.00
Deutonura albella (Stach, 1920)	0.92	-	-	-	1.00
Deutonura benzi Traser, Thibaud & Najt, 1993	0.58	3.50	-	-	1.32
Deutonura conjuncta (Stach, 1926)	0.17	-	-	-	1.00
Neanura cf. *alba* von Törne, 1956	0.08	-	-	-	1.00
Neanura muscorum (Templeton, 1835)	0.08	1.75	-	-	1.10
Anurida granulata Agrell, 1943	0.08	-	-	-	1.00
Pseudachorutes dubius Krausbauer, 1898	0.08	-	-	1.75	1.10
Pseudachorutes parvulus Börner, 1901	-	0.25	-	-	1.00
Pseudachorutes subcrassus Tullberg, 1871	0.17	-	-	-	1.00
Xenyllodes armatus Axelson, 1903	-	2.50	-	-	1.00
Onichiuridae					
Heteraphorura variotuberculata (Stach, 1934)	6.42	-	-	-	1.00
Hymenaphorura dentifera (Stach, 1934)	-	0.63	-	-	1.00
Onychiuroides granulosus (Stach, 1930)	7.67	7.00	0.22	-	2.06
Protaphorura armata (Tullberg, 1869)	-	-	10.44	-	1.00
Protaphorura bicampata (Gisin, 1956)	-	-	4.33	2.38	1.84
Protaphorura cancellata (Gisin, 1956)	3.25	18.38	-	-	1.34
Protaphorura serbica (Loksa & Bogojevic, 1967)	-	-	0.22	-	1.00
Tullbergiidae					
Mesaphorura macrochaeta Rusek, 1976	0.17	1.25	-	-	1.26
Paratullbergia callipygos (Börner, 1902)	0.08	-	-	-	1.00
Stenaphorurella quadrispina (Börner, 1901)	-	0.13	0.44	-	1.52
Cyphoderidae					
Cyphoderus albinus Nicolet, 1842	0.50	-	0.11	-	1.42
Entomobryidae					
Entomobrya corticalis (Nicolet, 1842)	2.67	0.88	0.33	0.25	2.11
Entomobrya multifasciata (Tullberg, 1871)	-	-	-	-	1.00
Lepidocyrtus arrabonicus Traser, 2000	-	0.25	-	-	1.00
Lepidocyrtus cf. *tellecheae* Arbea & Jordana, 1989	3.83	-	0.11	-	1.06
Lepidocyrtus cyaneus Tullberg, 1871	-	-	2.56	-	1.00
Lepidocyrtus lanuginosus (Gmelin, 1788)	5.58	0.38	-	-	1.13
Lepidocyrtus paradoxus Uzel, 1890	-	-	0.11	-	1.00
Pseudosinella cf. *horaki* Rusek, 1985	4.42	1.00	-	-	1.43
Heteromurus nitidus (Templeton, 1835)	0.83	-	-	-	1.00
Orchesella cincta (Linnaeus, 1758)	-	-	+	-	
Orchesella flavescens (Bourlet, 1839)	0.17	0.13	-	0.13	2.94
Willowsia nigromaculata (Lubbock, 1873)	-	-	-	0.13	1.00

Table 1 continued

	BF	OAEF	WM	THFM	*HA*
Isotomidae					
Cryptopygus bipunctatus (Axelson, 1903)	-	-	0.33	-	1.00
Folsomia manolachei Baggnall, 1939	2.33	10.25	-	-	1.43
Folsomia penicula Bagnall, 1939	60.75	-	-	-	1.00
Folsomia quadrioculata (Tullberg, 1871)	1.00	1.00	6.33	66.13	1.26
Isotoma viridis Bourlet, 1839	-	-	4.56	8.25	1.85
Isotomiella minor (Schäffer, 1896)	25.17	69.63	29.11	90.00	3.17
Isotomurus palustris (Müller, 1776)	-	-	-	3.88	1.00
Parisotoma notabilis (Schäffer, 1896)	0.17	0.13	3.78	-	1.16
Subisotoma pusilla (Schäffer, 1900)	14.67	-	-	-	1.00
Tetracanthella pericarpatica Kaprus & Tsalan, 2009	-	7.75	-	0.50	1.13
Tomoceridae					
Tomocerus minor (Lubbock, 1862)	5.83	-	-	-	1.00
Tomocerus mixtus Gisin, 1961	11.58	-	-	-	1.00
Tomocerus vulgaris (Tullberg, 1871)	0.08	-	-	-	1.00
Pogonognathellus flavescens (Tullberg, 1871)	0.17	-	-	-	1.00
Neelidae	-	-	-	-	
Megalothorax minimus Willem, 1900	0.75	5.88	-	0.13	1.30
Dicyrtomidae					
Dicyrtomina minuta (Fabricius, 1783)	-	-	1.11	1.13	2.00
Arrhopalitidae					
Arrhopalites acanthophthalmus Gisin, 1958	-	0.13	-	0.63	1.38
Arrhopalites terricola Gisin, 1958	0.33	-	-	-	1.00
Arrhopalites ulehlovae Rusek, 1970	-	0.13	-	-	1.00
Katiannidae					
Sminthurinus aureus (Lubbock, 1862)	-	-	++	0.13	1.00
Sminthurinus bimaculatus Axelson, 1902	-	1.63	0.33	12.13	1.32
Sminthurididae					
Sphaeridia pumilis (Krausbauer, 1898)	0.92	0.25	-	2.50	1.88
Sminthuridae					
Allacma fusca (Linnaeus, 1758)	0.25	-	-	-	1.00
Caprainea marginata (Schött, 1893)	0.83	1.50	-	0.88	2.77
Lipothrix lubbocki (Tullberg, 1872)	0.42	-	0.22	0.50	2.74
Sminthurus nigromaculatus Tullberg, 1871	-	-	+++	-	
Sminthurus viridis (Linnaeus, 1758)	-	-	+	-	

Of the collected species only about the 42% occurred in more than one habitats, which means that most of the species are habitat specialists. The species with the highest habitat amplitude was *Isotomiella minor* occurring with high abundance in both the forest and open habitats. The collected Tomoceridae species (*Tomocerus minor, T. mixtus, T. vulgaris* and *Pogonognathellus flavescens*) are typical surface dwelling forest species, which were only found in the samples from the beech forest. Another silvicolous species connected to the beech forest and sampled in high abundance are *Xenylla boerneri* and *Folsomia penicula*. The euedaphic *Protaphorura* species (Onychiuridae) were mostly collected from the two wet meadow habitats with the exception of *P. cancellata* which, although also known from meadows, seems to be more "silvicolous" in this area compared with the other *Protaphorura* species typical for open habitats (*P. armata* and *P. bicampata*). Further characteristic meadow species are *Isotoma viridis* and *Isotomurus palustris.*

Table 2 shows the most important structural characteristics of the Collembola communities found in the four habitats.

Table 2: Collembola community characteristics in the sampled habitats
S – species richness, A – average abundance (specimens/100 cm³), H' – Shannon's diversity index, J – Pielou's equitability index, CDI – community dominance index (%)

	S	*A*	*H'*	*J*	*CDI*
beech forest	39	182.17	2.382	0.6501	47.16
oak-ash-elm forest	28	152.25	2.006	0.6021	57.80
mesotrophic wet meadow	19	65.78	1.874	0.6366	60.13
tall herb fen meadow	20	195.13	1.474	0.4922	80.01

Species richness was higher in the forest habitats compared with the meadows (Fig. 15a) due to the wider range of microhabitats usually offered in a woodland area. The highest number of species (39) was found in the beech forest, which can probably be explained also by the diversity of plant species including trees, since in a "pure" beech forest the species richness is usually lower (TRASER 1980). In the meadow habitats the species number was about the half (19-20) while the lowland oak-ash-elm forest represents an intermediate habitat with the 28 species collected.

Shannon diversity showed a similar yet not the same trend as experienced in species number (Fig. 15b). Its numerical value was the highest in the beech forest and somewhat lower in the oak-ash-elm stand. For what concern the open habitats, despite of the lower species richness, diversity was higher in the mesotrophic wet meadow compared with the tall herb fen meadow, due to the more even distribution of specimens among species (Fig. 15c).

Rather unexpectedly, the habitat containing the most abundant Collembola community appeared to be the tall herb fen meadow (Fig. 15d). This interesting phenomenon

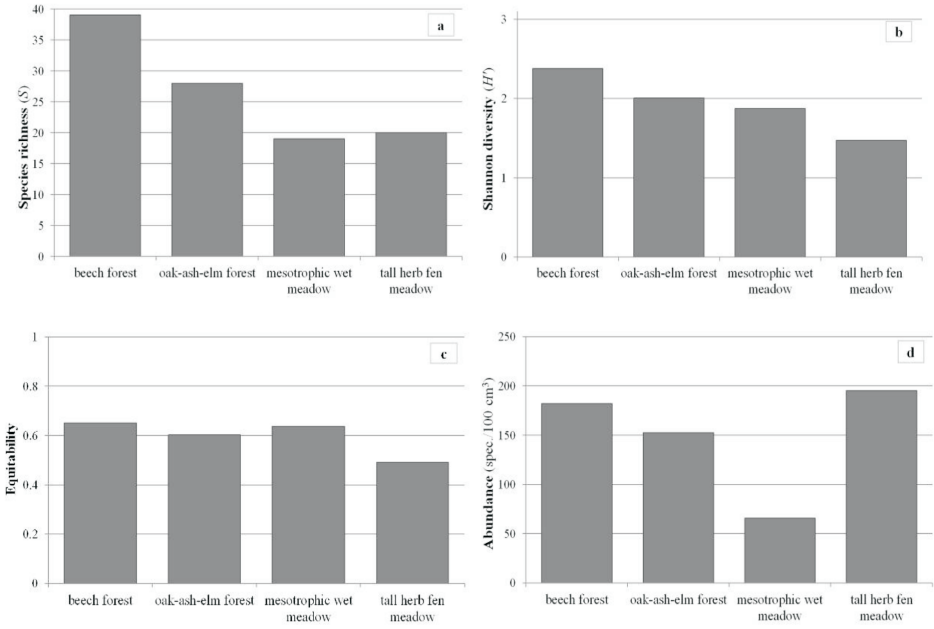

Fig. 15 a-d. Species richness, Shannon diversity, equitability and abundance

can probably be explained with the presence of the huge amount of decaying plant matter washed down by the river Csörnöc to the bank sediment, offering optimal environment for the mass occurrence of surface dwelling and hemiedaphic Collembola species such as *Isotomiella minor* or *Folsomia quadrioculata*. The latter species is especially known for its colonisation ability.

The values of the community dominance index (CDI) and the species rank abundance curves (Fig. 16) well emphasise the differences between the dominance structures of Collembola communities found in the sampled habitats. The dominance index was the lowest (~47%) in the beech forest indicating a relatively balanced dominance structure. The most dominant species was *Folsomia penicula*, a rather silvicolous, mesophil species occurring with an average of 60 spec./100 cm^3 abundance. Subdominant species were *Isotomiella minor* and *Xenylla boerneri*. The dominance indices of the communities in the lowland oak-ash-elm forest and in the mesotrophic wet meadow were about the same (~60%). In both communities, the eudominant species appeared to be *Isotomiella minor*, while the second dominant species came from the genus *Protaphorura* (*P. cancellata* in the oak-ash-elm forest and *P. armata* in the wet meadow). The highest dominance index was obtained in the community found in the tall herb fen meadow. The dominance structure is therefore unbalanced and the equitability is very low mainly because of the already mentioned mass occurrence of *Isotomiella minor* and *Folsomia quadrioculata.*

The agglomerative cluster analysis based on two measures of similarity, the Jaccard's single linear index and the Bray-Curtis index, resulted in two different dendrograms

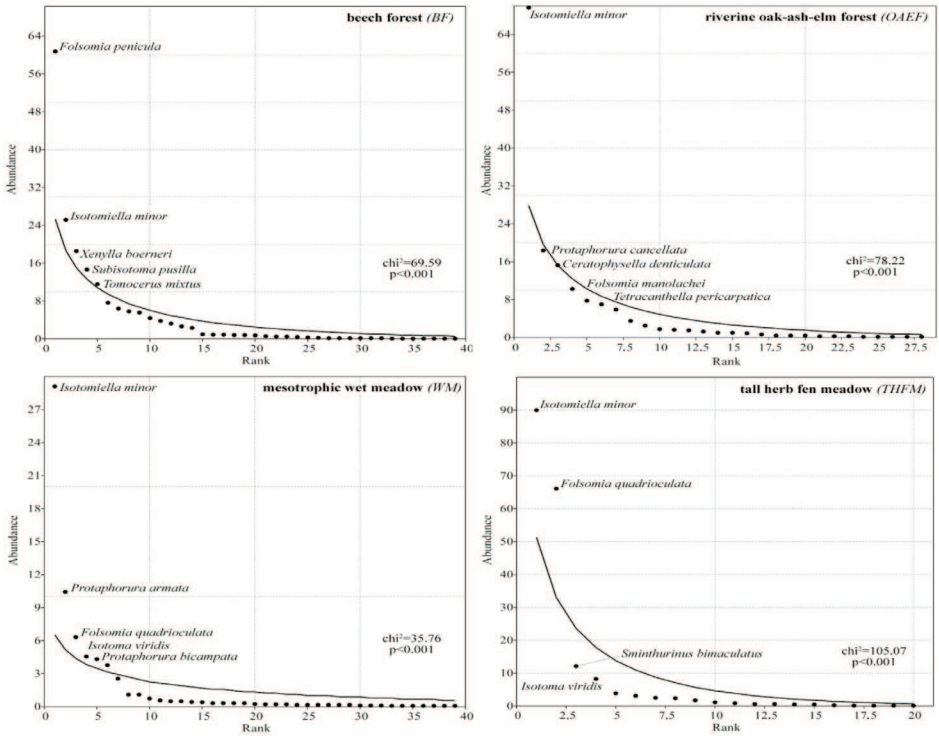

Fig. 16: Rank abundance curves (log series) of Collembola communities of the studied habitats

(Fig. 17a-b). The first classification (Jaccard) revealed two groups of habitats, the open and forest habitats. The second classification (Bray-Curtis) shows the complete separation of the beech forest from the other habitats. Apart from the different vegetation type, explanations for this phenomenon could be the higher altitude of the beech stand and the greater distance from the river, which can have a remarkable impact on soil conditions and, in consequence, on the Collembola communities. The second group contains the three lowland habitats. This group is further subdivided into two subgroups, separating the oak-esh-elm forest from the two open meadow habitats with relevant differences.

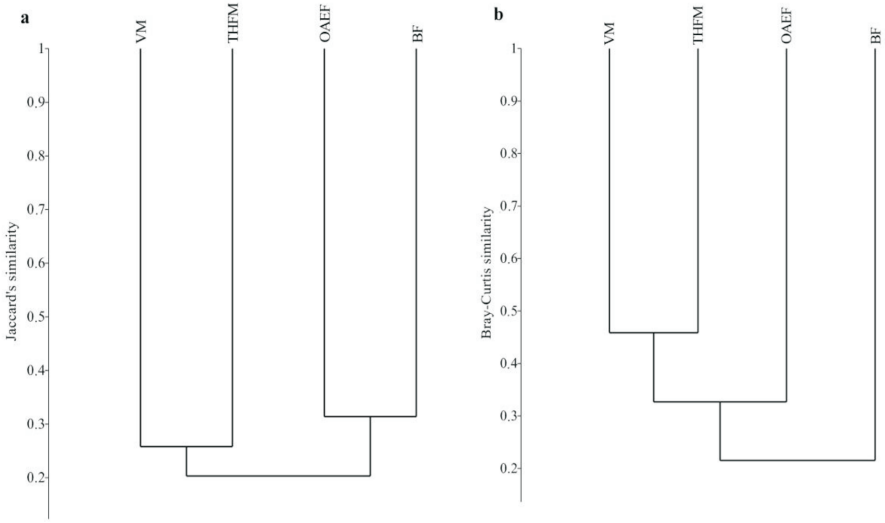

Fig. 17a-b: Dendrogram based on cluster analysis using the Jaccard index (a) and the Bray-Curtis index (b) of similarity
(BF – beech forest, OAEF – oak-ash-elm forest, WM – mesotrophic wet meadow, THFM – tall herb fen meadow)

Conclusions

The Vasvár-Nagymákfa area is characterized by a rich Collembola fauna. With the sampling carried out in the 6th Hungarian Biodiversity Day the number of Collembola species known from the Őrség has almost doubled and, including the two species new to the Hungarian fauna (*Tetracanthella pericarpatica* and *Arrhopalites acanthophthalmus*), the number of recorded species in Hungary increased to 435.

Acknowledgements

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Additions and corrections to the checklist of true bugs of Hungary (Hemiptera: Heteroptera)

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Torma, A. & Rédei, D.: *Additions and corrections to the checklist of true bugs of Hungary (Hemiptera: Heteroptera)*.
Abstract: The checklist of the Heteroptera fauna of Hungary is complemented. *Xylocoris* (*Stictosynechia*) *lativentris* (J. Sahlberg, 1870) (Anthocoridae), *Orsillus maculatus* (Fieber, 1861) (Lygaeidae) and *Ochetostethus balcanicus* (Wagner, 1940) (Cydnidae) are reported as new species to the fauna of Hungary. Re-examination of voucher specimens concluded that the following species were recorded from Hungary by misidentified specimens only, therefore these are deleted from the Hungarian checklist: Scutelleridae: *Odontotarsus robustus* Jakovlev, 1884; Pentatomidae: *Neottiglossa lineolata* (Mulsant and Rey, 1852). Species previously recorded from Hungary but erroneously omitted from the latest published checklist are discussed as well.

Keywords: Heteroptera, Hungary, faunistics, new record.

Introduction

Based on critical study of the literature, an up-to-date checklist of the Heteroptera occurring in Hungary was published by Kondorosy (1999). A few years later the same author supplemented his checklist with additional records, corrections of some erroneously reported or omitted species, and a summary of new records published after his checklist (Kondorosy 2005). Only a few species have subsequently been recorded from the country (Torma 2005, Harmat et al. 2006, Rédei 2006).

The aims of present study were 1) to clarify the occurrence of some species previously reported from Hungary and 2) to report new species to the fauna of Hungary.

Material and Methods

All studied specimens are deposited in the Hungarian Natural History Museum, Budapest (HNHM).

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Results and Discussion

Three species are added to the checklist of the Heteroptera of Hungary; another two species, reported on the basis of misidentified specimens, are deleted from the checklist of Hungary in this paper. Two additional species, erroneously omitted from the checklists of KONDOROSY (1999, 2005), are discussed as well.

Tingidae

Galeatus spinifrons (Fallén, 1807)

Specimen examined: Pesthidegkút: Kálvária-hegy, 10. VII. 1976, leg. F. Németh (1 macropterous ♀).

Old records of this species refer to *G. affinis* (Herrich-Schäffer, 1835). The species was first recorded from Hungary by PÉRICART (1983). Since the specimen studied by Péricart (Kecskemét, 14. VII. 1889) could not be found in the HNHM, the species was not included in the checklist of the Hungarian Heteroptera by KONDOROSY (1999, 2005) (E. Kondorosy, pers. comm.). The above specimen proves the occurrence of the species in Hungary.

Tingis (*Tropidocheila*) *ragusana* (Fieber, 1861)

Specimens examined: Jósvafő, 17. VI. 1980, leg. Á. Soós (1 ♀); Tornai-karszt, 18. VI. 1980, leg. Á. Soós (1 ♂); Aggtelek, 19. V. 1981, leg. A. Orosz (1 ♂).

The species was first reported to occur in Hungary by FÖLDESSY et al. (1999) (Aggtelek National Park, Baradla-völgy), and it was erroneously omitted from the Hungarian checklist (KONDOROSY 1999, 2005).

Anthocoridae

Xylocoris (*Stictosynechia*) *lativentris* (J. Sahlberg, 1870)

Specimen examined: Szeged-Tápé, Vesszős, floodplain area of the River Tisza, mixed oak-poplar forest (E74°17'89", N10°55'51"), 2–18. IX. 2007, pitfall trap, leg. A. Torma (1 ♀).

This species is known from the eastern and northern part of Europe (Germany, Czech Republic, Poland, Romania, Ukraine, Sweden, Finland) and from Middle Asia (Kazakhstan, Mongolia, etc.) (PÉRICART 2001). It is new to the fauna of Hungary.

Lygaeidae

Orsillus maculatus (Fieber, 1861)

Specimen examined: Szeged, Becsei street, collected on the wall of a block of flats, 28. VI. 2011, leg. A. Torma (1 ♀).

The species feeds on conifers and is a vector of a widespread disease caused by the fungus *Seiridium cardinale* (e.g. ROUAULT et al., 2006). A Holomediterranean species of which nearest occurrence is known from Croatia; its distribution and biology was discussed in detail by ROUAULT et al. (2005). It is new to the fauna of Hungary.

Cydnidae

Ochetostethus balcanicus (Wagner, 1940)

Specimens examined: Magyarcsanád, 15. VII. 2010, leg. M. Bozsó (1 ♂, 2 ♀♀).

Another species of the genus, *O. opacus* (Scholtz, 1847) is widely distributed in Hungarian sand grasslands, and has similar habitat preference as *O. balcanicus* (Kis 1984). Reliable identification of the two species is only possible based on the male genitalia (MAGNIEN 2006), therefore part of the earlier records of *O. opacus* from Hungary might represent *O. balcanicus*. Further specimens of *O. balcanicus* were collected in Nagypél (Pilu, Romania) near to the Hungarian border (13. VII. 2010, leg. M. Bozsó (1 ♂, 3 ♀♀)) so it presumably occurs in the nearby meadows in Hungary, too. It is new to the fauna of Hungary.

Scutelleridae

Odontotarsus robustus Jakovlev, 1884

This species was reported for the first time from Hungary by HALÁSZFY (1954) without mentioning any localities. Later the same author (HALÁSZFY 1955) listed several localities of the species (a few of these can be found outside the current border of Hungary). She regarded *O. robustus* to occur sporadically all over the country (HALÁSZFY 1959). The species was later recorded from different Hungarian localities by ROZNER (2004). KONDOROSY's (2001) record was based on a misidentified specimen deposited in the HNHM (Kondorosy pers. comm.).

Re-examination of the several Hungarian specimens previously identified as *O. robustus*, deposited in the HNHM, revealed that all of them belong to *O. purpureolineatus*, a relatively frequent species in Hungary. Most specimens of which locality data were presented by HALÁSZFY (1955) as well as all specimens of which data were presented by ROZNER (2004) and KONDOROSY (2001) were examined and concluded to represent *O. purpureolineatus*. Although *Odontotarsus robustus*, a Mediterranean species, might occur in Hungary (first of all in the southern part of the country), in lack of voucher specimens it is deleted from the Hungarian fauna list.

Pentatomidae

Neottiglossa lineolata (Mulsant and Rey, 1852)

Without explicitly mentioning it as new record to Hungary, the species was first mentioned from the country by BAKONYI and VÁSÁRHELYI (1987) (see also KONDOROSY 1999). No further occurrence has been reported so far. Re-examination of the specimens mentioned by BAKONYI and VÁSÁRHELYI (1987) (Ócsa, Nagy-erdő, 28. V. 1952, leg. Á. Soós, 1 ♂; same locality, 20. V. 1952, leg. É. Halászfy, 1 ♀; same locality, 30. VII. 1952, leg. Kakassné, 1 ♀) revealed that they belong to *N. pusilla* (Gmelin, 1790). No specimens of *N. lineolata* collected within the current border of Hungary could be located in the HNHM. Although *N. lineolata*, a Ponto-Mediterranean species, might eventually occur in Hungary (first of all in the southern part of the country), in lack of voucher specimens it is deleted from the Hungarian fauna list.

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Nohoveus vanharteni sp. n. from Oman (Neuroptera: Myrmeleontidae)

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Ábrahám, L.: *Nohoveus vanharteni sp. n. from Oman (Neuroptera: Myrmeleontidae).*
Abstract: *Nohoveus vanharteni* sp. n. from Oman is described and compared to *Nohoveus palparis* Klapálek, 1914, *Nohoveus implexus* (Walker, 1853) and *Aspoeckiana caudata* (Navás, 1913). With 11 figures.

Keywords: new species, Neuroptera, Myrmeleontidae, Oman.

Introduction

Genera (*Aspoeckiana* Hölzel, 1969; *Holzezus* Krivokhatsky; 1992, *Iranoleon* Hölzel, 1968; *Lopezus* Navás, 1913; *Myrmecaelurus* Costa, 1855; *Nohoveus* Navás, 1919; *Nophis* Navás, 1912) of Myrmecaelurini Esben-Petersen, 1918 are distributed mainly in the Palearctic region (Krivokhatsky 1988). Some species of the tribe spread in the transitional zone in the Oriental and the Ethiopian realms, too. This tribe is characterized by 1-3 pairs of pleuritosquamae and the absence of pilula axillaris in the hind wing of male.

Nohoveus Navás, 1919 is closely related to genus *Myrmecaelurus* Costa, 1855. In this genus, wing of male is somewhat longer than abdomen, abdomen of female is always shorter than that of male, pronotum longer than wide, apical area of hind wing without gradual cross-veins (except aberrant specimens), gonarcus and parameres are long narrow and strongly bent. In opposite of this, *Myrmecaelurus* has about same length of abdomen as the wings in both sexes. Wings are wide and there are gradual cross-veins in the apical areas. Gonarcus and parameres are stout and slightly curved, male ectoproct is never longer than the ventral edge of last sternal segment.

Monotypic genus *Naya* was designated by Navás (1932), type species is *Naya stigmata* Navás, 1932, it was synonymized by Aspöck et al. (2001) to *Nohoveus*. Soon after this, Stange (2004) confirmed the validity of *Naya* based on the enlarged last segment of labial palps which is not typical of the other *Nohoveus* species.

Naya stigmata Navás, 1932 proved to be a junior synonym of *Nohoveus palparis* Klapálek, 1914, its type designated by Hölzel (1968). Also Aspöck et al. (2001) synonimized *Nohoveus surcoufi* Navás 1918 from Libya to *Nohoveus palparis* Klapálek, 1914. (white labels: "*/Alger, Ain Sefra, 5.VIII:1910 Coll. F. Werner/ /Myrmec. palpalis Klap./ red label: /Lectotype ♀ Myrmecaelurus palpalis Klapalek H. Hölzel 1968*/" preserved in Nature History Museum in Wien (NHMW) (Fig. 1).

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In neuropterological papers and books (HÖLZEL 1982, STANGE 2004, ASPÖCK et al. 2001), taxonomical rank of taxonomic position of genus *Nohoveus* is always subject of discussion: some papers discuss it as synonym of *Myrmelcaelurus* and other times, others as subgenus of genus *Myrmelcaelurus*. However, the latest comprehensive taxonomical work written by KRIVOKHATSKY (2011) mentioned as a valid genus which I could also support.

Taxonomical part

Nohoveus vanharteni sp.n. (Fig. 2)

Material examined:
Holotype male: Oman Al Batinak Region, Nakl 264 m, 23º25,1519'N; 57º49,246'E, 11.10.2009, leg: Ilniczky S., Simonyi S.
Paratypes: 3 males, 12 females as holotype
Holotype and paratypes are deposited in the entomological collection of Somogy County Museum, Kaposvár. 1 paratype female is deposited in the entomological collection of Upper Silesian Museum, Bytom.

Head: Vertex strongly arched; yellow with two large transversally elongated brown spots anteriorly and with two small round and brown spots posteriorly (Figs 3-4). Frons, gena, clypeus and labrum shiny yellow without any marks and hairs. Mandible yellow with dark brown apices and inner margin. Maxillar and labial palps yellow. Last segment of labial palps very large as long as clypeus, brownish, its sensory pit slit-like well defined, end of palp incised (Fig. 4). Eyes large and shiny brown. Antenna 2.5x longer than diameter of eye. Scape, pedicel, flagellar segments and club brownish above and yellowish below. Segments with very short pale hairs.

Thorax: Pronotum longer than wide, yellow with wide lateral and narrow central brown stripes (Fig. 3). Lateral stripes not reach anterior margin while central stripe not reach posterior margin. Pronotum with short sparse and white hairs, pronotal margin with some long and stiff hairs. Mesonotum and metanotum yellow with interrupted wide dark brown middle and lateral stripes. Central line with elongated spots. Meso- and metanotum almost bare. Sides yellow with very short sparse and white hairs.

Legs: Fore coxa yellow with large brown spot in outside. Middle and hind coxae yellow. Femora yellow with distal yellowish brown suffusion and with sparse stiff and white bristles. Fore and middle femora shorter than fore and middle tibiae. Hind femur as long as hind tibia. Tibial spurs pale somewhat shorter than segment 1-2 combined on fore and middle legs and about as long as basitarsus on hind leg. Tarsi and tibiae with sparse stiff and black bristles. Tarsal segment 1 as long as segment 2-3, segment 5 as long as segment 1-4 combined. Claws shiny pale, half length compared to segment 5.

Wings: Fore wing: 18.5 mm long, 5 mm wide. Hind wing: 16.5 mm long, 4 mm wide. Wings elongated with obtusely angled anal area and rounded apices. Membrane transparent. Venation yellow, not dense. Only Sc marked with faintly brownish dashes. Fore wing with 6 radial cross-veins before origin of R. Radial sector with 7 branches. Apical area with cross-veins. Pterostigma light brown proximally and yellow distally with 5 cross-veins. Hind wing with 4-5 radial cross-veins before origin of R. Radial sector with 7 branches. Pterostigma light brown proximally and yellow distally with 3 cross-veins. Apical area without cross-veins.

Fig. 1: Lectotype of *Nohoveus palparis* Klapálek, 1914 preserved in Natural History Museum Wien

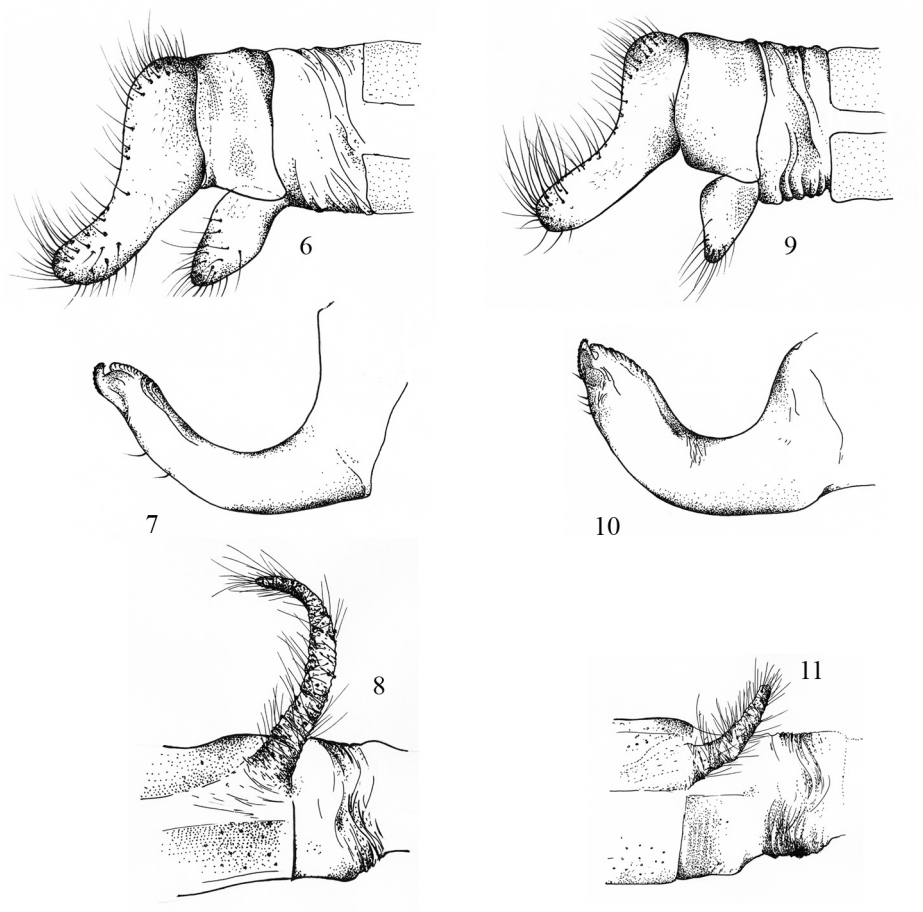
Fig. 2: Habitus of *Nohoveus vanharteni* sp.n.

Fig. 3: Notum pattern of *Nohoveus vanharteni* sp.n.

Figs 4-5: Head of *Nohoveus vanharteni* sp.n. with the enlarged last segment of labial palps in frontal view (Fig. 4); Apex of female abdomen of *Nohoveus vanharteni* sp.n. in lateral view (Fig. 5)

Abdomen: 20-21 mm long. Males abdomen longer than the length of wings. Tergite 1 yellow with dark brown middle spot and with long white hairs. Tergites yellow with brown central line and interrupted brown to faintly brown lateral lines. Tergal segments with very long rather dense and white hairs. The pair of pleuritosquamae on segment 6 and 7 rather stout (Fig. 11). Sternites yellow with indistinct central brown spot and also with rather long white hairs.

Genitalia: Apex of abdomen as in Figs 9. Gonarcus and parameres as in Fig. 10.



Figs 6-11: Apex of male abdomen, gonarcus and parameres, distal pleuritosquamae in lateral view: *Nohoveus palparis* (Figs: 6-8.); *Nohoveus vanharteni* sp.n. (Figs: 9-11.)

Paratype females: Fore wing: 18.5 mm long, 5 mm wide. Hind wing: 16.5 mm long, 4 mm wide. abdomen 16-17 mm long (Fig. 2). Abdomen shorter than wings and without conspicuous pubescence. Genitalia female as in Fig. 5. Otherwise like holotype.

Comment: The new species can be easily distinguished from the similar species of the genus by the enlarged last segment of labial palp. Superficially (especially females), it is similar to *Aspoeckiana caudata* (Navás, 1913) but it has narrower wings than the new species and its pattern on thorax is also different. Probably, TIGAR and OSBORNE (1999) found the new species in the United Arab Emirates since they listed as "*Myrmecelaurus* cf. *caudatus* Navás". However, ASPÖCK et al. (2001) did not catalogued it from Western Palaearctic region. According to KRIVOKHATSKY (1998a) it is known only from Central Asia.

The other similar species, *Nohoveus palparis* has almost entirely yellow body with faintly brownish lines on the pronotum and two small black spots on the notum, its abdomen is unicolour, yellow. While the new species has brown lines and spots on pro-, meso- and metanotum as well as a wide brown middle line on tergal segments (Fig. 3). Ectoproct of male of *N. palparis* in lateral view is slightly wider than that of *N. vanharteni*. The ventral part of gonarcus and parameres of *N. palparis* is curved while that of *N. vanharteni* is rather straight. The pair of distal pleuritosquamae shows also differences, this organ of *N. palparis* is longer than that of the new species (Figs 6-11).

The new species is also similar to *Nohoveus implexus* (Walker, 1853) but the pattern of pronotum, the shape of ectoproct and smaller measurement distinguish them from each other. *N. implexus* (Walker, 1853) is known from India (GHOSH 1981) and probably in Pakistan (IQBAL and YOUSUF 1991). *Nohoveus* genus is not characterised by the "Fig. 1. A B" in the paper published by IQBAL and YOUSUF (1991), consequently the specimen is misidentified. Based on the features and published figures, *Nohoveus virgulatus* Iqbal and Yousuf, 1991 also seems to be only a species of *Myrmecaelurus*.

Nohoveus palparis seems to be a widespread species in North Africa: Algeria (KLAPÁLEK 1914), Egypt (KIMMINS 1951), Libya (POGGI 1993), Tunisia (GÜSTEN 2002), Mauritania (KRIVOKHATSKY 1998b), an unpublished new data from Morocco (Erg Hamada Mhamid N29°50"51.9'; W05°35'41.8" 27.06.2008 leg: Ábrahám L., Bognár L., Nagy L. 1 female in coll. SCMK) and in the Middle East: Iran (HÖLZEL 1968), Israel (SIMON 1979), Saudi Arabia (HÖLZEL 1982, 1988, 1998), and unpublished new data found from Pakistan Prov. Balochistan desert SW from Quetta 24.07.2005 Leg. Gurko 1 male, 4 females; Pakistan Prov. NW FPS Waziristan agency near Tanai 02-12.09.2005 Leg. Gurko 1 female; and Iran Prov. Esfahan Qumsar (Quaz An) 1772m N33°44.425'; E51°28.905' 2005.07.06. Leg: Ábrahám L. 1 female; Iran Prov. Yazd Aliabad 1157m N32°03.436'; E54°12.309' 2005.07.04. Leg: Ábrahám L. 1 female in coll. SCMK.

The new sp. is known only from Oman.

Etymology: The new species is dedicated to Antonius van Harten, the Dutch entomologist who made significant contribution to our knowledge on the fauna of Arabian Peninsula.

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"*On the other hand, what is this Eastern aeschnoides*?" (Morton 1926) – an undescribed *Palpares* species from the Eastern Mediterranean (Neuroptera: Myrmeleontidae)

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Ábrahám, L: *"On the other hand, what is this Eastern aeschnoides?" (Morton 1926) – an undescribed Palpares species from the Eastern Mediterranean (Neuroptera: Myrmeleontidae).*
Abstract: This paper summarizes the history of *Palpares libelloides* (Linnaeus, 1764) and related taxa described from the Mediterranean in the neuropterological literature. Based on these results *Palpares assyriorum* sp. n. from Syria, Jordan, Turkey and Israel is described. *Libellula turcica* Petiver & Empson, 1767 is a new homonym of *Libellula* Linnaeus 1758 (Odonata) (hom. n.) and a new synonym of *Palpares libelloides* (Linnaeus, 1764) (syn. n.). *Palpares aeschnoides* is a nomen nudum, only a collection name. *Palpares chrysopterus* Navás, 1910 is a valid taxon and *Palpares turcicus* Koçak, 1976 (syn. n.) is a new junior synonym of *Palpares chrysopterus* Navás, 1910.

Keywords: ant-lion, new species, Palpares, Mediterranean

Introduction

Even though the large and decorative *Palpares libelloides* (Linnaeus, 1764) is a well-known ant-lion species, in taxonomical, nomenclatural and faunistical literature, the status and the distribution of this species and its related taxa has been unclarified in the entomological publications for centuries.

The only one taxon, "*Palpares libelluloides* (Linnaeus, 1767)" from Southern Europe was mentioned by Aspöck et al. (1980) in their monograph. This taxon was considered morphologically variable, and *Palpares hispanus* Hagen, 1860 from the Iberian Peninsula was not regarded as a separate species.

Twenty years later, species status of *Palpares hispanus* was changed by Aspöck et al. (2001) but they emphasized that "*Palpares libelluloides"* and related taxa were very variable in this work. On the whole, both excellent works agreed that the taxonomical status of "*Palpares libelluloides*" and its closely related *Palpares hispanus* Hagen, 1860 is uncertain.

In a recently published prominent book, Krivokhatsky (2011) is concerned with the taxonomical status of the species belonging to the *Palpares* genus in the Mediterranean. He came to the conclusion that the name of "*Palpares libelluloides* (Linnaeus, 1767)" was used for several valid taxa (*Palpares hispanus* Hagen, 1860, *Palpares aeschnoides*

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(Illiger, 1807), *Palpares papilionoides* (Klug in Ehrenberg, 1834), *Palpares turcicus* Koçak, 1976) but their distribution is not clear.

Not only in the above mentioned works but also in many papers the opinion of neuropterologists varies on the validity of the different taxa. One can find numerous arguments for and against the existence of these taxa in the neuropterological literature, which I intend to follow closely later in this study.

So I started to deal with the taxonomic and nomenclatural problems described above, when a larger series of collected material was available to me from Turkey and later from Iran. However, I got the real motivation when wanted to put a dozen *Palpares* from Syria into the entomological collection of Somogy County Museum (SCMK) and noticed that all of these specimens in size and morphological characters differ significantly from those taxa found in Eastern Mediterranean. After reading some papers, I had to realize quickly that there was a complex taxonomic and nomenclatural problem.

Material and methods

The research work was carried out in two general directions. First of all, I thoroughly studied all the literature ever published on taxonomical, nomenclatural and faunistical data concerning to *Palpares* species.

The other part of the research consisted of the thorough morphological study of the types and topotypes, the samples collected around their sites of origin of the type material. Examined materials are listed in the results and discussion chapter.

Results and discussion

In the first part, the taxa collected in or ever reported from the Mediterranean area are focused and then the information found in the literature based on our recent knowledge are reevaluated.

The second part of the section describes the results of taxonomical examinations.

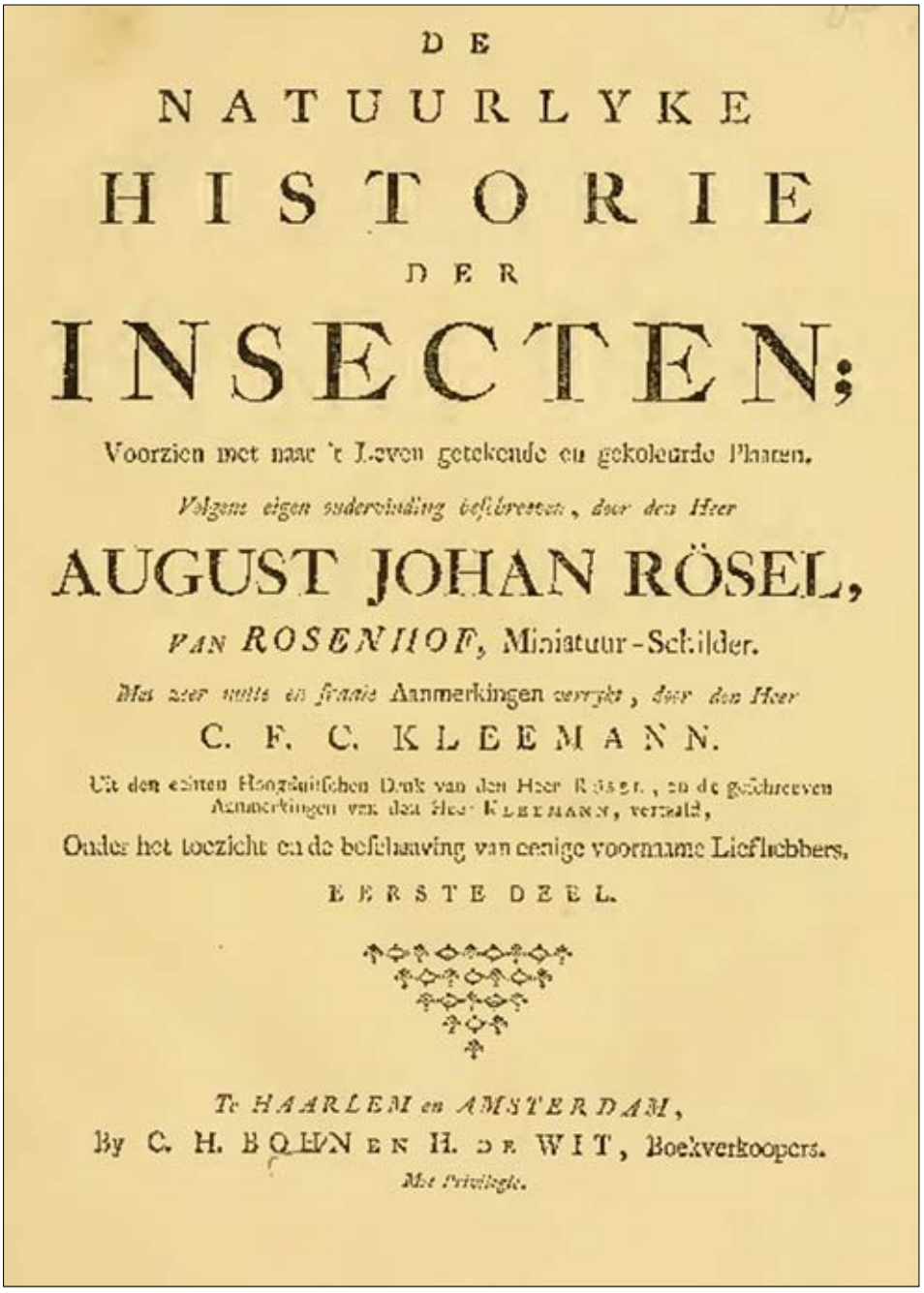
Abbrevations: Chlist – Checklist, Comb – New combination, Dist – Distribution, K – Key with comment, Mon – Monograph, Morf – Morphology, Nom – Nomenclature, Odescr – Original description, Syn – Synonym, Syst – Systematics

Palpares Rambur, 1842 – a short historical outline on the genus

Type species: *Hemerobius libelloides* (Linnaeus, 1764) designated by CHENU & DESMAREST 1859 (as *Palpares libelluloides* [sic!] (Linnaeus, 1767)).

The largest (the length of fore wing 30-80 mm) and most decorative species with darkly spotted wings belong to the subfamily Palparinae Banks, 1911. The subfamily is characterized by not connecting 1A and CuP in the fore wing and pronotum shorter than wider apart from some exceptions.

In the 10th edition of the Systema Naturae, LINNAEUS (1758) classified some species into the order of Neuroptera and the genus of *Hemerobius*, which nowadays are considered different species of Neuroptera families (Chrysopidae, Hemerobiidae, Myrmeleontidae).



DE

NATUURLYKE

HISTORIE

DER

INSECTEN;

Voorzien met naar 't Leven getekende en gekoleurde Plaaten.

Volgens eigen ondervinding beſchreeven, door den Heer

AUGUST JOHAN RÖSEL,

VAN ROSENHOF, Miniatuur-Schilder.

Met zeer nutte en fraaie Aanmerkingen *verrykt, door den Heer*

C. F. C. KLEEMANN.

Uit den eersten Hoogduitschen Druk van den Heer Rösel, en de geschreeven Aanmerkingen van den Heer Kleemann, vertaald,

Onder het toezicht en de beſchaaving van eenige voorname Liefhebbers.

EERSTE DEEL.

Te HAARLEM en AMSTERDAM,

By C. H. BOHN en H. DE WIT, Boekverkoopers.

Met Privilegie.

Fig. 1: Inner title page from Rösel & Kleemann's book (1764-68)

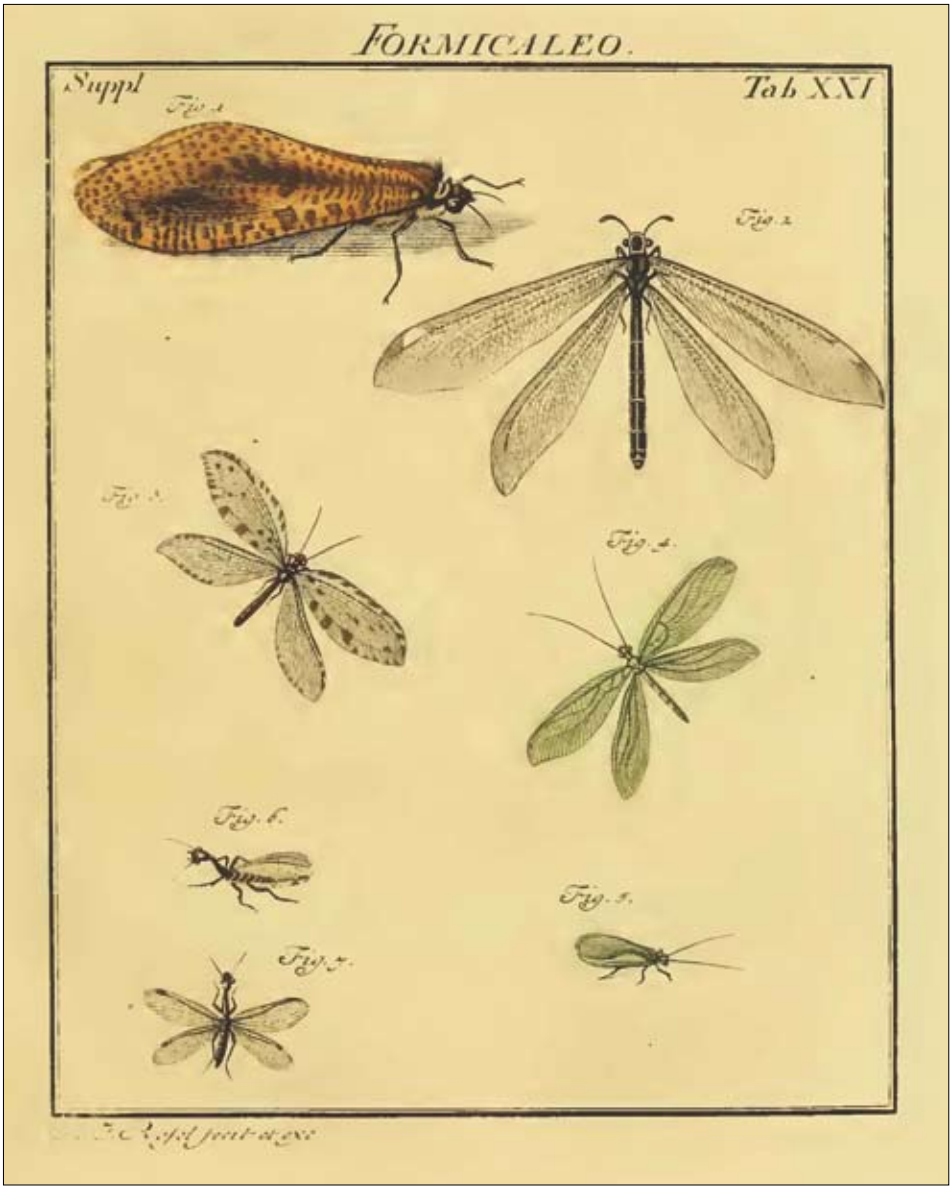


Fig. 2: *Palpares speciosus* (Linnaeus, 1758) "*Fig. 1.*" - was artistically illustrated by RÖSEL (1755)

In the 12th edition of the Systema Naturae, LINNAEUS (1767) moved the ant-lion species in the genus *Myrmeleon* Linnaeus, 1767 (e.g. as "*Myrmeleon libelluloides"* Linnaeus, 1767). Almost a hundred years later the genus *Palpares* Rambur, 1842 was described but the type of specimen was not yet designated by RAMBUR (1842) since *Myrmeleon libelluloides* was also a well known species in Europe. This designation was done later on by CHENU & DESMAREST (1859) as "*Palpares libelluloides* (Linnaeus, 1767)" occurring in Southern Europe and in and around Asia Minor.

Palpares speciosus (Linnaeus, 1758) – the first described Palpares species

Myrmeleon maculatum De Geer, 1773 - DE GEER 1773 (Odescr), FABRICIUS 1775 (Syn), RAMBUR 1842 (Syn)
Myrmecoleon speciosus (Linnaeus, 1758) - BURMEISTER 1839 (Comb)
Palpares speciosus (Linnaeus, 1758) - RAMBUR 1842 (Comb)

In the 10th edition of the Systema Naturae, LINNAEUS (1758) described the species *Hemerobius speciosus* Linnaeus, 1758, which was moved by LINNAEUS (1767) into the genus *Myrmeleon* (as "*Myrmeleon speciosus"*) later. Its description was only one line long, but he referred to the excellent figure of RÖSEL (1755) which was also published (RÖSEL et al. 1764-68) several times (Fig. 2).

It was reported the species from Africa and from the south of Europe ("*Africa et Europa australi*").

Even today, RÖSEL's (1755) illustration contributes to the easy determination of the first described *Palpares* species. Rösel, being an excellent illustrator, depicted the animals so realistically that his beautiful drawings often became the base of the species description by LINNAEUS (1758).

Although, the specimen of *Palpares speciosus* was originally deposited in the Linnaeus's collections is uncertain (Fig. 3). In fact, the insect collection was rearranged and supplemented by the son of Linnaeus and Smith. Possible, the labels were moved

Fig. 3: The specimen of *Palpares speciosus* (Linnaeus, 1758) with labels preserved in the collection of the Linnean Society of London, in lateral and ventral views, specimen number: 2352

and transferred several times (FITTON and HARMAN 2007). Originality is supported by the fact that wings are not arranged and the pin is from Linnaeus's era. Contradict it: there is no the original label with species name. Although, the label "*papilionoides*" was written by Linnaeus with his typical handwriting which refers to the trivial name which used for color wing neuropterans (ant-lions and owl-flies). On the other hand, Linnaeus did never use the name of "*papilionoides*" for any ant-lions described by him. The largest second label "*libelluloides*" was written by Smith after purchasing the collection in 1784 when he relabeled the collection based on the 12th edition of the Systema Naturae.

Supposedly LINNAEUS (1758) knew about distribution of *Palpares libelloides* (Linnaeus, 1764) in the south of Europe from the work of PETIVER (1702) or RAY (1710), but he did not recognize the status of this taxon (*Palpares libelloides*) based on the descriptions and the illustrations (Fig. 4). The inaccurate distribution of both species (*P. speciosus* and *P. libelloides*) described by LINNAEUS (1758, 1764) caused taxonomical confusion later on.

OLIVIER (1811), however, reported this species only from Africa and distinguished between *Palpares* species (*P. speciosus* and *P. libelloides*) described by LINNAEUS (1758, 1764) based on morphologically and their distribution.

CHARPENTIER (1825) compared the two taxa morphologically and confirmed their different taxonomical status, but he could not clarify the differences between their occurring places.

The name of this species reappears in the monograph of BURMEISTER (1839), who classified the ant-lion species in the genus *Myrmecoleon* Berthold, 1827. He regarded *P. speciosus* (as *Myrmecoleon speciosus*) as a valid taxon, separating it from the species *P. libelloides* (as "*Myrmecoleon libelluloides*"). He distinguished between the two species morphologically as well as according to their distribution. Only South Africa was specified as the distribution for *P. speciosus*.

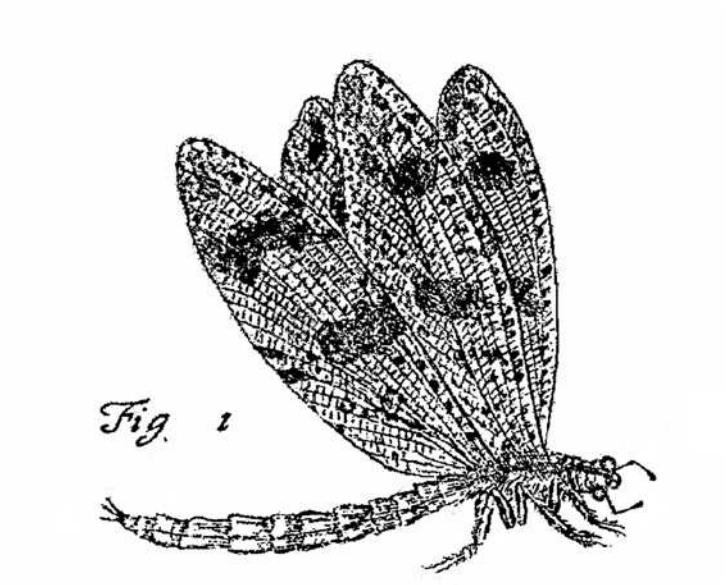


Fig. 4: *Libellula turcica* figured by PETIVER (1702)

Later on RAMBUR (1842) put the species into new combination as *Palpares speciosus* (Linnaeus, 1758), reporting the occurrence of the species only from the southern part of Africa (*cap de Bonne-Espérance*). RAMBUR (1842), who had described several *Palpares* species by then listed 16 *Palpares* species altogether in his monograph. He did not find CHARPENTIER's (1825) morphological comparison convincing enough and he doubted that Charpentier had really diagnosed *P. speciosus*.

Based on our recent knowledge it can be concluded that the distribution of *Palpares speciosus* (Linnaeus, 1758) is only spread in the southern hemisphere in Africa (South Africa), (MANSELL and ERASMUS 2002) and it is significantly different from the *Palpares libelloides* (Linnaeus, 1764) which distributed in the southern part of Europe and in Asia Minor.

The current status of *Palpares speciosus* (Linnaeus, 1758) is a valid (STANGE 2004) but the combination needs to be revised (MANSELL 2010).

Palpares libelloides (Linnaeus, 1764) or Palpares libelluloides (Linnaeus, 1767)

Hemerobius libelloides Linnaeus, 1764 - LINNAEUS 1764 (Odescr)
Libellula turcica Petiver & Empson, 1767 - PETIVER & EMPSON 1767 (**hom. n., syn. n.**)
Myrmeleon libelluloides [sic!] (Linnaeus, 1764) - LINNAEUS 1767 (Comb)
Myrmecoleon libelluloides (Linnaeus, 1767) - BURMEISTER 1839 (Comb)
Palpares libelluloides (Linnaeus, 1767) - RAMBUR 1842 (Comb)
Palpares libelloides (Linnaeus, 1764) – HAGEN 1866 (Comb), STANGE 2004 (Comb)

Six years after *Palpares speciosus* (Linnaeus, 1758) was described, another species of the genus *Palpares* was also described as "*Hemerobius libelloides* Linnaeus, 1764". According to LINNAEUS (1764), the area ("*Europe australi, Aleppo, Cap. b. spei"*) of this species was Southern Europe, Aleppo (Syria) and Cape of Good Hope, (South Africa). His description is much more detailed than that of *Palpares speciosus* described earlier. His work was probably facilitated by PETIVER (1702) who earlier mentioned and illustrated (Fig. 4) a species from Aleppo named as "*Libellula turcica*".

At the end of the 17th and at the beginning of the 18th century, James Petiver (1663-1718), an English researcher had significant achievements in several areas of science. He adopted the binominal nomenclature from the prominent naturalist John Ray (1627-1705), using binominal names to the living organisms. This nomenclature was effectively introduced only after the 10th edition of the Systema Naturae, in which a systematic scientific description was given of each species by LINNAEUS (1758). Petiver had such a telling affect, that his works were amended and published post mortem several times (PETIVER and EMPSON 1767). Today the species *Libellula turcica* Petiver & Empson, 1767 is to be considered a junior synonym of *Palpares libelloides*, since it meets the requirements of taxonomical methodology but the valid name was given three years earlier by LINNAEUS (1764). Besides this, the genus *Libelulla* Petiver & Empson, 1767 in Neuroptera is a new junior homonym of *Libellula* Linnaeus, 1758 (Odonata).

Contemporaneously with the work of PETIVER & EMPSON (1767), LINNAEUS (1767) published the 12th edition of the Systema Naturae, in which the species *Palpares libelloides* was listed again as "*Myrmeleon libelluloides"* in a new combination. While quoting his own work (LINNAEUS 1764) he either misspelled the name of this species or it was misprinted.

The original label handwritten by Linnaeus would solve the above mentioned question. The two specimens in the collection of the species can be found. The specimen number: 4924 has prepared wings but no labels (Fig. 5), its pin seems to be from Linnaeus's era. The specimen number: 4917 has wings at resting, labeled as "*Genoa*

Figs. 5-6: The specimen of *Palpares libelloides* without label and with arranged wings, specimen number: 4924 (Fig. 5); the specimen with label as "*Genoa 1787"* [Italy] and wings are in resting position, the specimen number: 4917 (Fig. 6) from the collection of the Linnean Society of London

Fig. 7: An excellent colour drawing of "*Myrmeleon libelluloides*" from Smyrna (today: Izmir), Turkey (DRURY 1770)

1787" [Italy] (Fig. 6). In 1778 Linnaeus died, probably Smith labeled the specimens because his handwriting is typical but the pin seems to be used in Linnaeus era.

This miswritting was first noticed by HAGEN (1866) who synonymized it as "*Libelloides L. Mus. L. Ulr. 401 = Palpares Libelluloides L.*". In the literature of neuroperology this was, however, long forgotten. Even HAGEN (1866) started to use the name *Palpares libelluloides* in his papers. Up to now, in the catalogues, publications and databases, almost without an exception (STANGE 2004, OSWALD 2007) have been using the names of *Palpares libelluloides*. As the 12th edition of the Systema Naturae was the most widely used in scientific works, the species was mentioned in the literature under this name for more than 200 years.

When the name "*Myrmeleon libelluloides*" was mentioned for the first time by LINNAEUS (1767), he also stated that *Libellula turcica* described in PETIVER's work (1702) was identical with "*Hemerobius libelloides*" described by him. He came to the same conclusion about the species named as "*Musca rarissima*" which was reported from Italy after the death of RAY (1710). However, he did not seem to know the exact distribution of the species, since he reported the occurrence from "*Oriente, Africa, inque Cap. b. spei*" (Asia Minor, Africa and Cape of Good Hope, South Africa) besides the southern part of Europe.

Being a very large and decorative species among the insects, *Palpares libelloides* is often illustrated in taxonomical studies. These figures help identify the species because the short descriptions at places often do not carry enough information to identify the species belonging to the genus *Palpares*. The illustration of RÖSEL et al. (1764-68) (Fig. 2) is a good example along with DRURY's (1770) drawings (Fig. 7) and his most detailed description ever given for a specimen found in Smyrna (today Izmir, Turkey) named as "*Myrmeleon libelluloides"*.

DRURY (1770) realized that the specimen from South Africa ("*Cape of Good Hope*") and the ones from Asia Minor were not conspecific but he did not recognize the difference between the two species, *P. libelloides* and *P. specious*. Ten years later, DRURY (1782) described and illustrated an ant-lion specimen from Sierra Leone as a variety of *Palpares libelloides*. However, this description and drawing later on were proved to belong to the species *Lachlathetes gigas* (Dalman, 1823) (Fig. 8) (DALMAN 1823) .

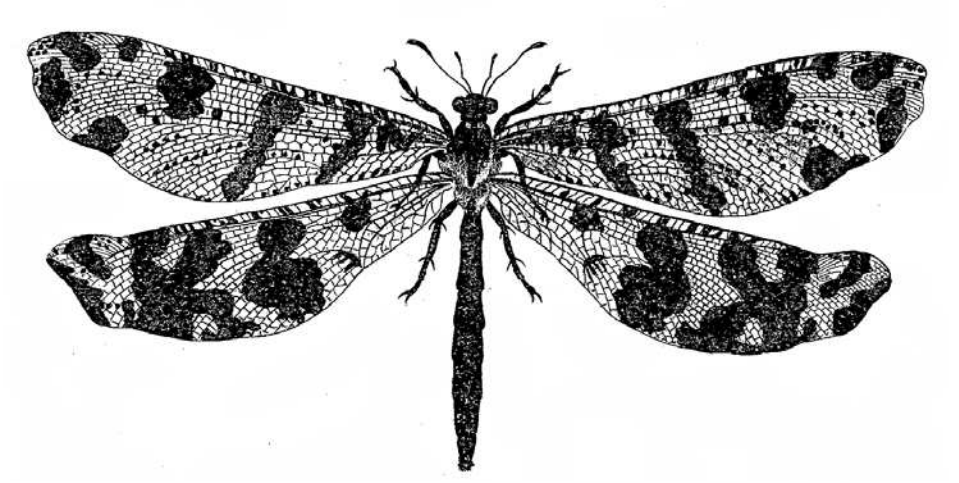


Fig. 8: A variety of *Palpares libelloides* from Sierra Leone (DRURY 1782) which was described by Dalman in 1823 as "*Myrmeleon gigas"*

The Swedish entomologist, De Geer (1752-1778) found Linnaeus system too progressive and he just partially used the binominal nomenclature in his works, often changing the names given by Linnaeus. This is how *Palpares speciosus* was renamed as "*Myrmeleon* (*maculatum*)" (De Geer 1773). It should be marked though that the figure in the work of DE GEER (1773) (Fig. 9) is similar to the earlier depicted *Palpares speciosus* (RÖSEL 1740), where the insect was presented in a natural position, at rest, with the closed wings above the abdomen. The wing patterns of the depicted animal are, however, similar to *Palpares libelloides*. The specimen described by De Geer (1773) was wrongly synonymized (FABRICIUS 1775) by a student of Linnaeus, the Danish Fabricius (1745-1808). According to him *Myrmeleon maculatum* De Geer, 1773 is a junior synonym of *Palpares libelloides*. By RAMBUR (1842), however, *Myrmeleon maculatum* occurring in Africa is the junior synonym of *Palpares speciosus*, which is accepted in the present day scientific nomenclature.

A thorough look at the species description of *Palpares libelloides* (as *Myrmeleon libelluloides*) in "*Systema Entomologiae*" can shed some light on the wrong synonym given by FABRICIUS (1775) since he marked South Africa as the distribution following LINNAEUS (1764, 1767). At the same time he claimed that *Palpares speciosus* was a somewhat variety of *Palpares libelloides* ("*A Hemerobius speciosus Linnaei ejusdem speciei?*") which is contradictory if the description year of the two species is considered. In his later works, FABRICIUS (1787, 1793) reported South Africa as the area for *Palpares libelloides*. Presumably the false distribution data, reported by LINNAEUS (1758, 1764, 1767), caused FABRICIUS (1775) not to separate the two species precisely.

Shortly after the first major work by FABRICIUS (1775), a report of the species was published in German as "*Myrmeleon libelluloides*" in the monograph published by SULZER (1776). While mentioning the species from Sicily he also documented the species with a very nice drawing, but the pattern on the hind wings and the body of *Palpares libelloides* is not typical (Fig. 10).

Another German entomologist, GMELIN (1788), following the Systema Naturae by LINNAEUS (1767), mentions "*Myrmeleon libelluloides*" as distributed in South Africa.

One year later, in the third volume of his comprehensive entomological study, the French VILLERS (1789) referred to the species as "*Myrmeleon libelluloides*" and he quoted the names and the figures of former researchers, adding South of France as a new record of distribution.

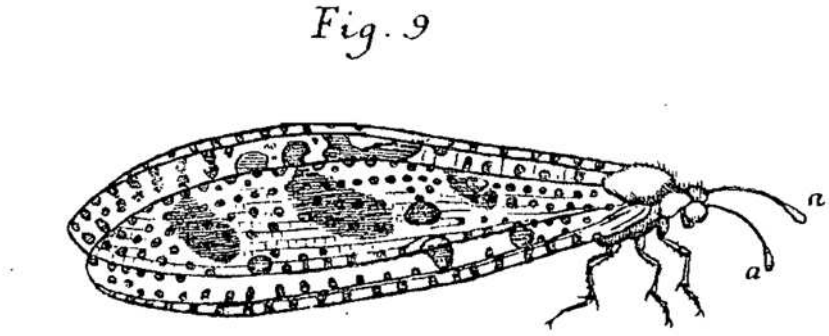


Fig. 9: De GEER's (1773) figure on "*Myrmeleon (maculatum)*" which was synonymised by RAMBUR (1842) as "*Palpares speciosus*"

Fig. 10: SULZER's (1776) illustration on "*Myrmeleon libelluloides Fig. 3*", however, the specimen may not be conspecific with *Palpares libelloides* or the drawing is rather artistic than realistic

In the first edition of "*Fauna Etrusca*" (ROSSI 1790) two recording sites of *Palpares libelloides* (as "*Myrmeleon libelluloides"*) ("*Florentine; Pisano*" - Firenze; Pizza) were mentioned from Italy. In his work ROSSI (1790) cited from several earlier monographs (LINNAEUS 1758, 1767, DRURY 1770, DE GEER 1773, RAY 1710, PETIVER 1702). It is a matter of curiosity that based on the species conception of FABRICIUS (1775), he probably considered both *Myrmeleon maculatum* and *Hemerobius speciosus* synonyms for *Myrmeleon libelluloides*. Besides this, he also described a new taxon from the vicinity of Pizza as "*Myrmeleon libelluloides pisanus*" which proved to be the junior synonym of *Acanthaclisis occitanica* Villers, 1789 later.

The distribution of the species was still not known by the first half of the 19th century. LEACH (1815) reported "*Myrmeleon libelluloides"* from the southern part of Europe and from Africa ("*the south of Europe, and all Africa*"). A couple of years earlier the French OLIVIER (1811) gave the distribution accurately as France, Greece, Italy and the eastern half of the Mediterranean Basin (as "*Levant*").

A few years before the species was combined to genus *Palpares*, the knowledge of the distribution of *P. libelloides* (as "*Myrmecoleon libelluloides"*) was completed by BURMEISTER (1839) by adding North Africa and the South of Europe to the species distribution.

In "*Histoire Naturelle des Insectes*", RAMBUR (1842) described the genus *Palpares* and he listed all the taxa described or illustrated in his earlier works (SAVIGNY 1805-1814, KLUG in EHRENBERG 1834) under the name of "*P. libelluloides Linné*". However, the distribution of the species was not clarified. He described a new morphological form of the species, marked as "*Varieté A*". He reported its occurrence from "*l'Andalousie et du cap de Bonne-Espérance Andalusia*" (South of Spain and South Africa). By doing so he pointed out the morphological characteristics of the later described *Palpares hispanus* Hagen, 1860, but he did not recognize the taxonomical status of *Palpares papilionoides* (Klug in Ehrenberg, 1834) by examining only one female specimen (more information below).

The usage of names such as *libelloides* or *libelluloides*, is still a nomenclatural controversy. In the voluminous monographs, ASPÖCK et al. (2001) and KRIVOKHATSKY (2011) preferred the traditional names (*Palpares libelluloides*). On the other hand, in STANGE'S (2004) monograph and OSWALD'S (2007) database the name *Palpares libelloides* was recommended. KRIVOKHATSKY (2011) suggested the usage of *libelluloides*, because this was the name the topotype of this species was referred as (CHENU and DESMAREST 1859). The current status of *Palpares libelloides* (Linnaeus, 1764) is a valid (STANGE 2004).

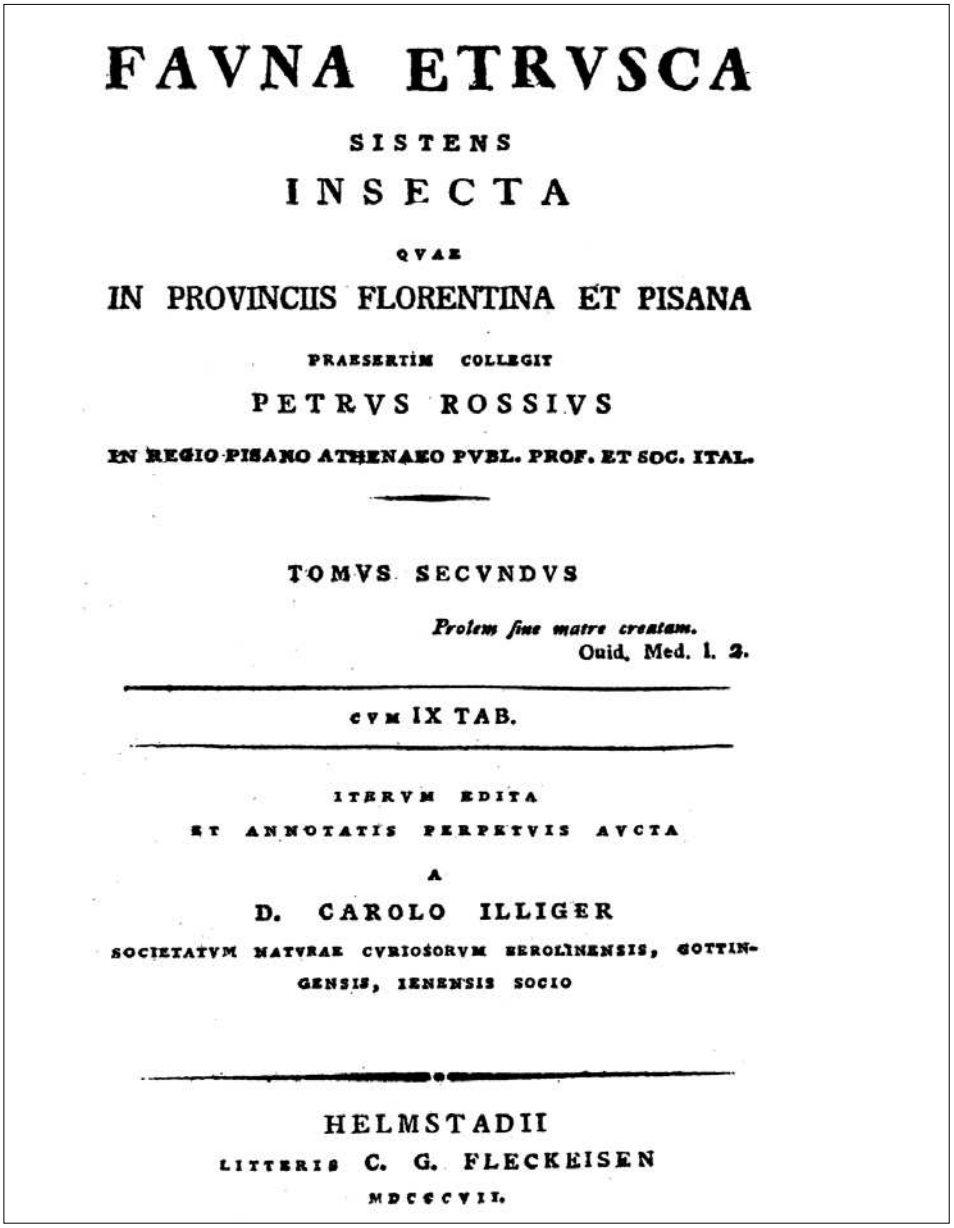
The history of the name of Myrmeleon aeschnoides up until present

Myrmeleon aeschnoides – ILLIGER in ROSSI 1807 (**nomen nudum**)
Palpares aeschnoides (Illiger, 1807) - HAGEN 1866 (Comb)

In the second edition of "*Fauna Etrusca*" (ILLIGER in ROSSI 1807), the German entomologist, Johann Karl Wilhelm Illiger (1775-1813) completed the work of ROSSI (1790) (Fig. 11). In this book a new name of *Palpares libelloides* was mentioned, marked by ILLIGER in ROSSI (1807) as "♀ *M. Aeschnoides Mus. Hellw. Hoffm.*"

In the editorial preface, ILLIGER in ROSSI (1807) stated that the symbol "♀", in front of the name of the species, referred to the synonym, which had never been used in the literature before. He found this name in the collection of Johann Christian Ludwig Hellwig (1743-1831) and Johann Centurius Hoffmann Graf von Hoffmannsegg (1766-1849).

The material collected between 1795-1801, in Hungary, Austria, Italy and Portugal by Hoffmannsegg was given to Illiger for revision when he stationed in Braunschweig (Brunswiek, Germany). His collection was the first one in the "*Berlin museum*" (ZMHB - Museum für Naturkunde der Humboldt Universitat zu Berlin, Bereich Zoologisches Museum, Berlin, Germany), where Illiger was employed as a curator. ILLIGER in ROSSI (1807) in his work pointed out that the species (as "*Hemerobius speciosus"* and "*Myrmeleon libelluloides*") described by LINNAEUS (1758, 1764) had been mixed up by certain researchworkers. It is probably due to the fact that LINNAEUS (1758, 1764) reported the occurrence of the two species as identical. ILLIGER in ROSSI (1807) mentioned the name "*Myrmeleon Aeschnoides*" while comparing the specimens in his collection with the descriptions and illustrations of *Palpares libelloides* in other works (LINNAEUS 1758, DRURY 1770). Therefore *Myrmeleon aeschnoides* is a nomen nudum – that is, no adequate description of such species was ever published, it is only a naked name used in Hoffmannsegg's a collection. During my research I have tried to find the specimen labeled as "*aeschnoides*" in the Berlin (ZMHB) and the Braunschweig (SNMBR) museums but no specimens with the exact name were found.



FAVNA ETRVSCA

SISTENS

INSECTA

QVAE

IN PROVINCIIS FLORENTINA ET PISANA

PRAESERTIM COLLEGIT

PETRVS ROSSIVS

IN REGIO PISANO ATHENAEO PVBL. PROF. ET SOC. ITAL.

TOMVS SECVNDVS

Prolem sine matre creatam.
Ouid. Met. l. 2.

CVM IX TAB.

ITERVM EDITA

ET ANNOTATIS PERPETVIS AVCTA

A

D. CAROLO ILLIGER

SOCIETATVM MATVRAE CVRIOSORVM BEROLINENSIS, GOTTINGENSIS, IENENSIS SOCIO

HELMSTADII

LITTERIS C. G. FLECKEISEN

MDCCCVII.

Fig. 11: Inner title page of Fauna Etrusca by ILLIGER in ROSSI (1807)

It is remarkable though, that DALMAN (1823) did not mention *Myrmeleon aeschnoides* but only referred from the work of ILLIGER in ROSSI (1807) as a monograph where a description was given on *P. libelloides* (as "*Myrmeleon libelluloides"*).

Later on another German entomologist, CHARPANTER (1825) mentioned the name *M. aeschnoides* as the synonym of "*M. libelluloides*", but after that the name could not be found in the literature, too.

At the end of the first half of the 19th century, RAMBUR's (1842) monograph was the most detailed checklist, in which RAMBUR (1842) cited from the work of ILLIGER in ROSSI (1807), but he did not mention the name *Myrmeleon aeschnoides* as well.

It was HAGEN (1858) to first use the name of "*Myrmeleon aeschnoides*" for a species described by Illiger (as "*M. aeschnoides Illiger Fn. Etrusc.*") occurring in Asia Minor, but he considered it to be conspecific with *Palpares libelloides*. In one of his later paper HAGEN (1860a) affirmed this information on *Palpares hispanus* Hagen, 1860 and reported that the specimen deposited in "*Mus. Berol.*" (ZMHB Berlin) was from Asia Minor and it was the synonym of "*M. libelluloides*". Later on HAGEN (1860b, 1866) was tenacious of his opinion. Under the name of *Palpares aeschnoides* he listed the species into a new combination (HAGEN 1866), but he emphasized that morphologically it distinguished from the *Palpares hispanus* and he thought it to be a synonym of *Palpares libelloides* together with *Palpares nordmanni* (Kolenati, 1846) reported from the Caucasus Mountains.

From this point, several authors referred to this name as a valid taxon. In the second half of the 19th and the first half of the 20th century the name *Palpares aeschnoides* seemed to cause major misunderstandings among the neuropterologists, especially when they tried to determine the specimens from the Middle East.

BRAUER (1876), who probably had an insight of Hagen's work, mentioned three *Palpares* species (*P. libelluloides, P. hispanus, P. aeschnoides*) when compiling the checklist of Neuroptera in Europe, but he was not sure that "*Palpares Aeschnoides Illig. ? = libelluloides Dalm. var. Kleinasien*" was a valid taxon.

MCLACHLAN (1873) studied some ant-lion species described by RAMBUR (1842) and among them some *Palpares* species. In his work, the species reported from the Arabian Peninsula by KLUG in EHRENBERG (1834) were supposed to be conspecific with the ones from the Mediterranean. He considered *Palpares papilionoides* (Klug in Ehrenberg, 1834) a local variety of *P. libelloides*, but on the other hand, in the same monograph, he assumed the species illustrated as "*Myrmeleon papilionoides varietas*" was conspecific with *P. aeschnoides* described by Illiger. MCLACHLAN's (1873) assumptions can later be found in the English neuropterlogical literature.

One year later KOLBE (1884) also studied some *Palpares* specimen collected in the Mediterranean (South of Europe, North Africa and Asia Minor). From taxonomical point of view, he did not distinguish between *P. libelloides* (as "*P. libelluloides*") and *P. hispanus*. He regarded *P. libelloides* as a variable species occurring in the whole Mediterranean. Therefore he reported *P. libelloides* not only from Morocco in North Africa, but also from Senegal. He made a remark, however, that the specimen from Senegal differed from *P. libelloides* known in Dalmatia (Croatia) and Greece, considering the patterns and the size of the wings.

Based on the research of PROST (2010) AKOUDJIN and MICHEL (2011), we can conclude that the species mentioned above are definitely not conspecific with *P. libelloides*. Today's knowledge of species distribution excludes the possibility of the occurrence of *P. hispanus* in Senegal.

KOLBE (1884) regarded the taxon from the eastern half of the Mediterranean ("*Brussa und Syrien*") as specimen similar to species *P. aeschnoides* mentioned by HAGEN (1860b), but when summarizing his opinion about the taxa he agreed to a revision considering the species of *Palpares*.

In one of his later studies, HAGEN (1887) mentioned the name of *P. aeschnoides* as a synonym of *Palpares papilionoides* Klug in Ehrenberg, 1834) (as "*Myrmeleon papilionoides*"). These synonyms later on cannot be found in the neuropterological literature.

A couple of years after the publication of KOLBE (1884), the name of *P. aeschnoides* appeared again in the paper of MCLACHLAN (1889) when investigating the fauna of the Strait of Gibraltar. In this work, MCLACHLAN (1889) did not investigate the taxon *P. aeschnoides* (as "*var. aeschnoides Illig.*") but he shed some light on the differences between *P. hispanus* and *P. libelloides* from morphological and distributional point of view. He drew borderline of the area of *P. libelloides* from the southern parts of France to Syria. Unlike KOLBE (1884) he regarded the two valid species and gave a differential diagnosis between them. He also criticized KOLBE (1884) for reporting *P. libelloides* from Africa, which led to confusion about the distribution of this species. To make things worse he mixed up the morphological characters of *P. libelloides* and *P. hispanus*. MCLAHCLAN (1889) therefore emphasized that *P. libelloides* did not occur in South Africa. He also supposed that *P. libelloides* var. *aeschnoides* can be found in the north-east of Africa (a smaller form of *P. libelloides* from Egypt). This assumption was based on the figure (Fig. 12) of the beautifully illustrated monograph of SAVIGNY (1805-1814) which shows a life-sized, habitus drawing with all its body parts (mandible and labial palps).

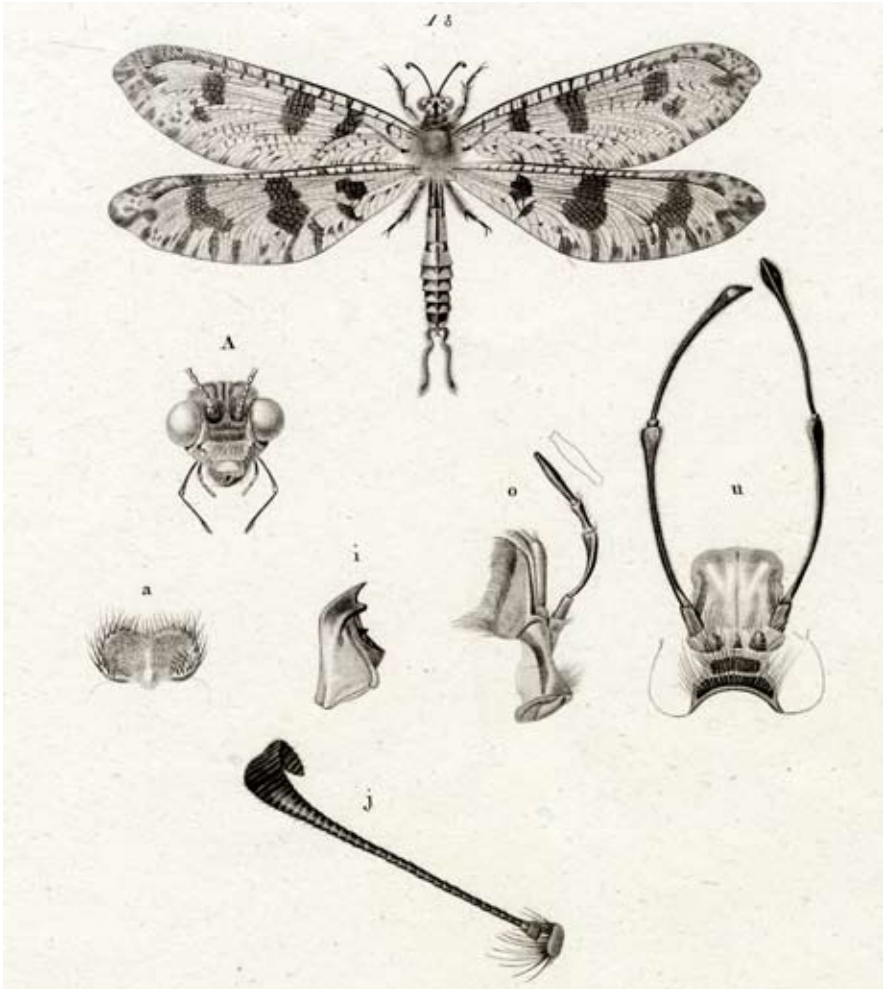


Fig. 12: SAVIGNY's (1805-1814) figures from "*Description de l'Égypte névroptères par Vol 2.*"

During the Egyptian campaigns, Napoleon decided to take with him a corps of scholars in order to discover the natural and cultural treasures. Savigny (Marie Jules César Lelorgne de Savigny, 1777-1851) was an excellent illustrator working in the zoological section run by Geoffroy (Étienne Geoffroy St. Hilaire, 1772-1844). During the expedition he drew two big plates of the neuropteran species, but no description of the species was given, and only the orders were identified (SAVIGNY 1805-1814). Several undescribed species were recorded by his artistic drawings which had been unknown to science until then. Among these are, for example, *Libelloides ictericus* (Charpentier, 1825), *Bubopsis hamata* (Klug in Ehrenberg, 1834), *Nemoptera aegyptiaca* Rambur, 1842, and *Nophis teillardi* Navás, 1912 etc. which were described only several years later.

After the turn of the 20th century, KLAPÁLEK (1906) reported the name *P. aeschnoides* (Fig. 13.) from Enyusek (Enyusek Dagh Taurus) (now in SE Turkey) in a paper, in which he listed three *Palpares* species. He separated *P. libelloides* (as "*P. libelluloides*") from *P. hispanus*, but it is worthy of note, that he did not give the author name to the third taxon *P. aeschnoides* unlike in the case of the other two taxa the abbreviations of authors were given. Therefore, it can be concluded that KLAPÁLEK (1906) was aware of the existence of the eastern Mediterranean species different from the *P. libelloides*, but he identified it as *P. aeschnoides*, probably based on HAGEN's (1958) work.

At the beginning of the 20th century, the name *P. aeschnoides* appeared in a study about the morphology of insects' wings (COMSTOCK 1918). The drawing illustrated the wing venation of a *Palpares* species. The occurrence of the species illustrated was not reported.

"*On the other hand, what is this Eastern aeschnoides?*" – it is a question, first worded by MORTON (1926), and published earlier on by MCLACHLAN (1873, 1889) which seemed to be under debate by all the entomologists studying specimens from the Middle East. MORTON (1926) investigated the ant-lion fauna of Palestine, and based on the results of MCLACHLAN (1889), he realized that the specimen he studied did not belong to either *P. libelloides* or *P. hispanus*. Being aware of this problem, he showed his specimen to Esben-Petersen, a prominent Danish neuropterologist of his age, who identified it as *P. hispanus*. He also clarified that the species *P. papilionoides* (Klug in Ehenberg, 1834) reported from Palestine by NAVÁS (1912) was also based on a false identification. However, the species *Palpares chrysopterus* Navás, 1910 described by NAVÁS (1910) was not taken into consideration.

From this time forth, the most extensive monographic coverage of the fauna of this area was presented by HÖLZEL (1972). Only some specimens of *P. libelloides* collected in Anatolia (Asia Minor) and Syria were available for HÖLZEL (1972) and among these, no specimens were found bearing the morphological characters of *P. hispanus*. Based on the research of MORTON (1926), HÖLZEL (1972) assumed that *P. aeschnoides*, a variety of *P. hispanus* could be found in the Middle East.

In the monograph of ASPÖCK et al. (1980, 2001), the species *P. libelloides* was regarded as an extremely polymorph taxon, and the validity of *P. hispanus* was questioned and KRIVOKHATSKY (1998a) was not cited.

In the faunistical work of KRIVOKHATSKY (1998a, 2011), the name "*P. aeschnoides (Illiger, 1807)*" appeared as a valid species besides *P. libelloides* and *P. hispanus*. The drawings of the wings and the genitalia were illustrated (Fig. 14). In addition, KRIVOKHATSKY (1998b) presented it as a valid taxon from Israel in his online database (ZIN database). In the Upper Silesian Museum (USMB Bytom, Poland), I found a specimen collected also in Israel identified as 1 female / "*Israel Camp Ziouani en. Ziwan (Gollan hills) III-IV. 1996 leg. R. Rosa / P. aeshnoides Ill.* [sic!] *det. Krivokhatsky* " (Fig. 15).

Fig. 13: The specimen determined by Klapálek as *Palpares aeschnoides* in coll. MNCN, Madrid

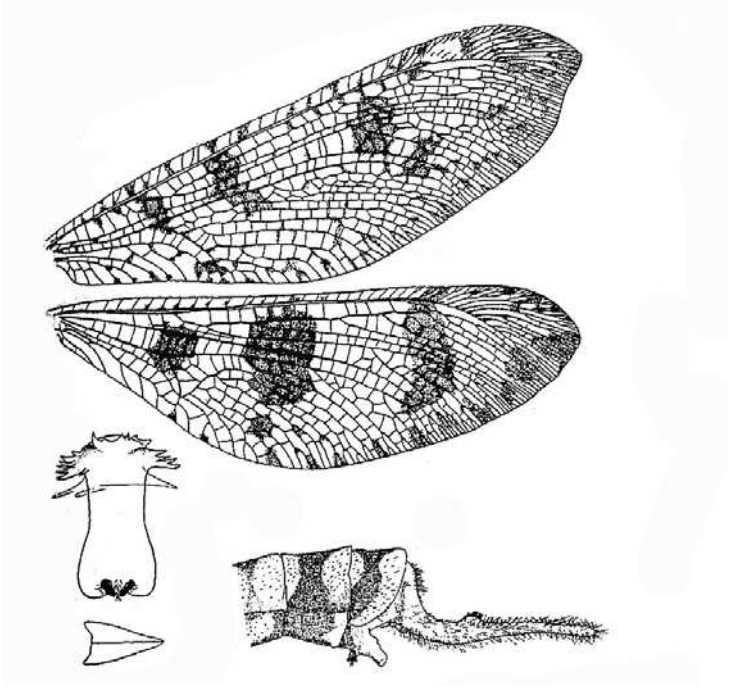


Fig. 14: KRIVOKHATSKY's (1998a) original figures on "*P. aeschnoides* (Illiger, 1807)" wings and male genitalia

Fig. 15: The female specimen from the collection of USMB (Bytom) determined by Krivokhatsky as "*P. aeshnoides*" [sic!]

Following HAGEN (1858) and KRIVOKHATSKY (1998b), the species was mentioned by STANGE (2004) as a valid taxon as *Palpares aeschnoides* Illiger in Rossi 1807.

It can be concluded after all, that the name of *P. aeschnoides* is a nomen nudum. Based on the work of HAGEN (1858), the name is reoccurring in the neuropterological literature, and the taxon, significantly different from *P. libelloides* or *P. hispanus* was only revealed by some entomologists investigating the fauna of Middle East and the eastern Mediterranean. This was emphasized mainly by MORTON (1926), but the species was not described due to the nomenclatural ambiguity in the literature.

The current status of the taxon is an invalid.

Actual and supposed synonyms of Palpares libelloides

Myrmeleon libelluloides var. ***nigriventris*** Costa, 1855

Myrmeleon libelluloides var. *nigriventris* Costa, 1855 – COSTA 1855 (Odescr), PANTALEONI 1999 (Tax)

According to PANTALEONI (1999), the status of the taxon is a nomen dubium or a junior synonym. In Costa's collection, he could not find the type species originating from Calabria. The description of taxon provided by Costa was based on PETAGNA's (1787) work. According to our present knowledge, in Italy only the nominotypical form of *P. libelloides* can be found. Specimens of the species with different colours have no taxonomical value.

The current status of the taxon is an invalid.

Palpares libelluloides var. ***nigripes*** Navás, 1912
Palpares libelluloides var. *nigripes* Navás, 1912 - NAVÁS 1912 (Odescr), DEVETAK 1992 (Tax)

NAVÁS (1912) mentioned only some differences in colour when he described this variety from the current distribution of the species ("*Portugal, Spain, Italy, N. Dalmacia, Asia Minor*"). Based on the syntypes described by NAVÁS (1912) from N. Dalmacia Gylek (MZBS), DEVETAK (1992) synonymized it.

The current status of the taxon is an invalid.

Myrmeleon nordmanni Kolenati, 1846
Myrmeleon nordmanni Kolenati, 1846 - KOLENATI 1846 (Odescr), HAGEN 1858, 1860a,b (Tax), KRIVOKHATSKY 2003 (Tax)

KOLENATI (1846) described the taxon from the area of Caucasus. The scientific name was used by HAGEN (1858, 1860a,b) in several papers, each time accompanied by Hagen's comments claiming it to be conspecific with the species of *Palpares libelloides*. Although Hagen admitted that he personally could not examine the species but, based on the description given by KOLENATI (1846), he said it could easily be identified with the well-known and common species of the Mediterranean (*Palpares libelloides*). HAGEN (1860a,b) upheld his synonymization in his later papers as well. Thereafter, in later monographs, the name of the species only occurred on the list of synonyms (BRAUER 1876, ASPÖCK et al. 1980, 2001, STANGE 2004).

Finally, the status of *Myrmeleon nordmanni* Kolenati, 1846 was clarified by KRIVOKHATSKY (2003, 2011) when he designated a lectotype specimen labeled as "*Myrmeleon Nordmanni Caucasus*" by Kolenati in the ZIN collection (Saint-Petersburg), consequently confirming its synonymization with *P. libelloides*.

The current status of the taxon is an invalid.

Palpares chrysopterus Navás, 1910
Palpares chrysopterus Navás, 1910 - Navás 1910 (Odescr), Navás 1913 (Descr), Aspöck et al. 1980, 2001 (Tax), Oswald 2007 (Tax)

Navás gave two descriptions of the species: first he described a male specimen (NAVÁS 1910) then a female (NAVÁS 1913); both specimens were from the area known today as Iran.

When describing the species for the first time, NAVÁS (1910) also published two illustrations. However, the published drawings did not feature the same specimen. The characteristic genitalia of "*Palpares chrysopterus Nav. (fig. 3)*, *Persia, Bazouft, Hout Karoum, Junio de 1899, ♂, cotipo (Escalara)*" can be seen in reversed position (Fig. 16). This specimen, in addition to another six specimens (2 males, 4 females), is part of the collection of Museo Nacional de Ciencias Naturales (MNMS) Madrid, Spain (lectotype and paralectotypes are designated by Ábrahám Fig. 17.). In this paper NAVÁS (1910) the wing pattern of a female specimen of "*Palpares chrysopterus* sp.n." ("*Kourdistan de Sineh (R. de Mecquenem, J. de Morgan, 1908*") was presented which otherwise can be seen in the Museum National d'Histoire naturelle, Paris (MNHN), France (Fig. 16). The description of the above mentioned female specimen was published only three years later (NAVÁS 1913) without an illustration.

The species described by NAVÁS (1910) was synonymized by BANKS (1913) in a paper focusing on *Palpares* genus. Banks (1913) considered the taxon as a variety of *P. libelloides*.

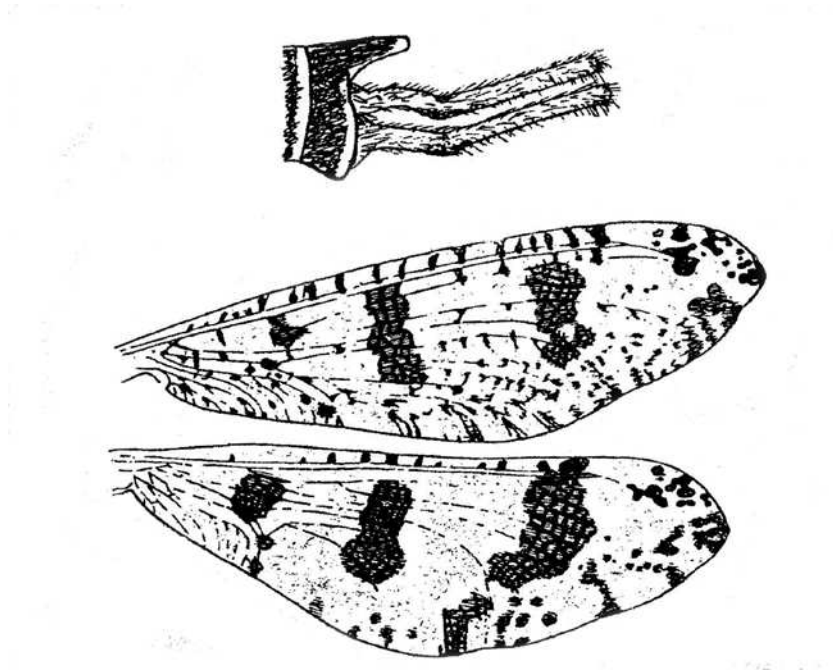


Fig. 16: NAVÁS's (1910) figures on "*Palpares chrysopterus Nav. (fig. 3)*" male abdomen in reversed position, drawing of wing from the female specimen found in the Museum National d'Histoire naturelle (MNHN), Paris

Fig. 17: The designated lectotype of *Palpares chrysopterus* Navás, 1910

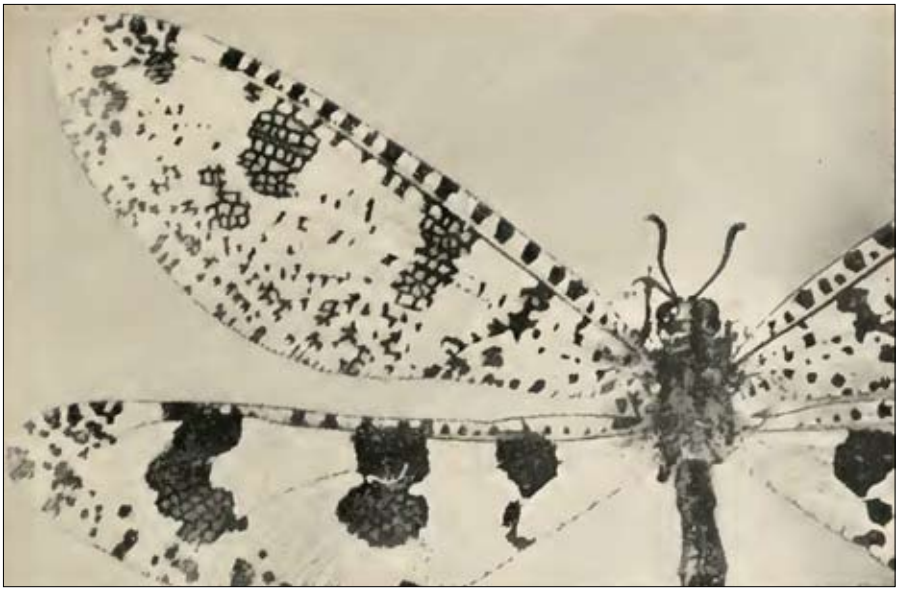


Fig. 18: KOÇAK's (1976) original figure
"***Fig. 3. Palpares hispanus turcicus ssp. n. - ♂ (Holotype)***"

The name of the species could not be found in HÖLZEL's (1972) monograph, describing the ant-lion fauna of Middle East, although the synonym names of other species from this region were listed.

The name of the species was only mentioned in the voluminous monographs of ASPÖCK et al. (1980, 2001) as the synonym of *P. libelloides*.

Although NAVÁS (1913) gave a description of the species in his later publications repeatedly, the time of the species description can be dated around 1910 since the description given by NAVÁS (1910) fulfilled all the criteria of species description. The name presented in NAVÁS (1913) was a primarly junior homonym (OSWALD 2007). STANGE (2004) listed both descriptions of the species among the synonym names of *Palpares libelloides* without mentioning homonymy.

The examination of the designated lectotype specimen housed in Madrid revealed that *Palpares chrysopterus* Navás, 1910 is conspecific with taxon *Palpares turcicus* Koçak, 1976.

The current status of the taxon is a valid.

Palpares hispanus turcicus Koçak, 1976 and ***Palpares turcicus*** Koçak, 1976 (Fig. 18)
Palpares hispanus turcicus Koçak, 1976 - KOÇAK 1976 (Odescr), ASPÖCK et al. 2001 (Syn)
Palpares turcicus Koçak, 1976 - KOÇAK 1995 (Tax), STANGE 2004 (Syn)

The taxon described by KOÇAK (1976) was regarded as a synonym of *P. libelloides* by ASPÖCK et al. (1980). The authors in this monograph did not consider *P. hispanus* a valid taxon either. They reiterated this opinion in their later monograph ASPÖCK et al. (2001), too. Although *P. hispanus* was listed as a valid species at this time and *P. hispanus turcicus* was mentioned as a synonym of *P. hispanus*.

KOÇAK et al. (1995) changed the status from subspecies to species. In his online database (ZIN database), KRIVOKHATSKY (1998b,) mentioned it as a valid species, however it was not included in the published checklist (KRIVOKHATSKY 1998a). More than a decade later, the species was mentioned by (KRIVOKHATSKY 2011) as a valid species again.

The status of taxon was not discussed in the monograph written by ASPÖCK et al. (2001). STANGE (2004) mentioned it among the list of synonyms, but the synonym of the species was not indicated as "*NEW SYNONYM*" in this book.

During examination of the male specimen of *Palpares chrysopterus* Navás, 1910, *Palpares turcicus* Koçak, 1976 proved to be a junior synonym of *Palpares chrysopterus* Navás, 1910.

The current status of the taxon is an invalid.

Palpares hispanus Hagen, 1860

Palpares hispanus Hagen, 1860 – HAGEN 1860 (Odescr), KOLBE 1884 (Syn), BRAUER 1876 (Tax), ASPÖCK et al. 1980 (Syn), 2001 (Tax)

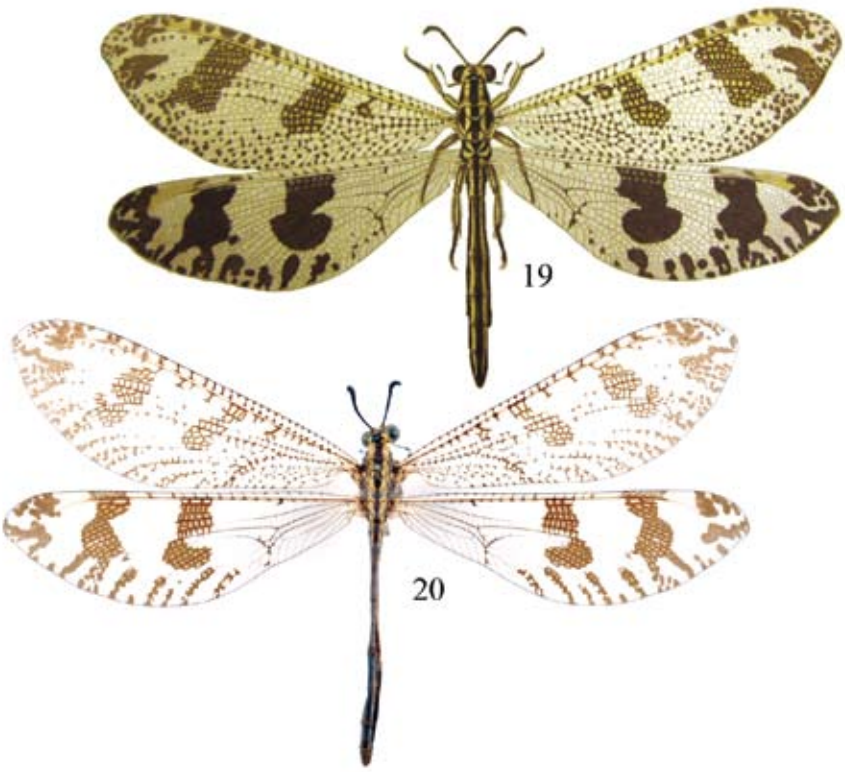
For the beginning of the 19th century, the real distribution of *P. libelloides* was more clearly understood, especially the fact that the species did not occur in South Africa. At the same time, even before the description of *Palpares hispanus*, it was also presumed (RAMBUR 1842, WALKER 1853) that a *Palpares* taxon different from *P. libelloides* populated the West Mediterranean.

RAMBUR (1842) reported *Palpares libelloides* from the South of Europe and Constantinople (today: Istanbul, Turkey) and distinguished it, for the first time, from species collected in Spain. He referred to them as a Spanish (Andalusia) variety of *P. libelloides*. WALKER (1853) also regarded the taxon living in Spain as a variety of *P. libelloides*.

Not much later, HAGEN (1860a) described a new *Palpares* species from the Mediterranean, namely *Palpares hispanus* Hagen, 1860, and gave a differential diagnosis on *P. libelloides* and *P. hispanus* taxa. Hagen (1860b,c) further clarified the distribution of *P. hispanus* ("Spain and Tunesia") in a later publications. Soon after this, he gave a brief description of the larvae of the species (HAGEN 1866) stating, at the same time, that all the specimens he had examined earlier, previously assumed to be *P. libelloides* from Spain, proved to be *P. hispanus*. Later on, HAGEN (1873) and MCLACHLAN (1873) simultaneously produced a detailed description of the larva of the species. A few years later, it was listed as a valid species by the Austrian BRAUER (1876) in his European fauna catalogue, too.

Nevertheless the taxonomical status of *P. hispanus* later became uncertain, as KOLBE (1884) published a paper claiming that *P. hispanus* was only a variety of *P. libelloides* and the *Palpares libelloides*-group required revision. This opinion has dominated the German literature ever since i.e. HÖLZEL (1972), ASPÖCK et al. (1980, 2001).

On the other hand, mainly due to the publications of MCLACHLAN (1889), *P. hispanus* was presented as a valid species in the English literature (MCLACHLAN 1889, 1898, BANKS, 1913, MORTON 1926, STANGE 2004) as well as in the Spanish literature (PICTET 1865, NAVÁS 1904, 1915, 1916, MONSERRAT 1978, 1982, MONSERRAT and DÍAZ-ARANDA 1987, DÍAZ-ARANDA and MONSERRAT 1988). MCLACHLAN (1889) pointed out that KOLBE (1884), by specifying Africa as an occurring place of *P. libelloides*, did not facilitate the clarification of the actual distribution of the species. To make the situation even worse, he confused the morphological characters of *P. libelloides* and *P. hispanus*. In his study, he emphasized the different characters of the two species and noted that *P. libelloides* did not occur in North Africa. Furthermore he presumed that *P. hispanus* also lived in the



Figs. 19-20: KLUG in EHRENBERG (1834) "*Tab. XXXV. Fig. 2.*" as "*Myrmeleon papilionoides*" a female specimen of *Palpares papilionoides* (Fig. 19) and the same in photo (Fig. 20)

Northeast of Africa, he regarded this taxon from Egypt as a smaller form of *P. hispanus* (see section on *P. aeschnoides* taxon).

Apparently, the distribution of *P. hispanus* requires further clarification especially in North Africa as this species can certainly be found from Spain to Tunisia. However, the specimens from the region stretching from Egypt to the Northeast of Iran were surrounded by taxonomical uncertainties. Species from this area were defined in various different ways: *P. hispanus* (NAVÁS 1911, 1926, ESBEN-PETERSEN 1918, MORTON 1926, SIMON 1979) and *P. hispanus turcicus* (KOÇAK 1976), *P. turcicus* (KOÇAK et al. 1995), *P. libelloides* (HAGEN 1860a, NAVÁS 1926, HÖLZEL 1972, ASPÖCK et al. 1980, 2001).

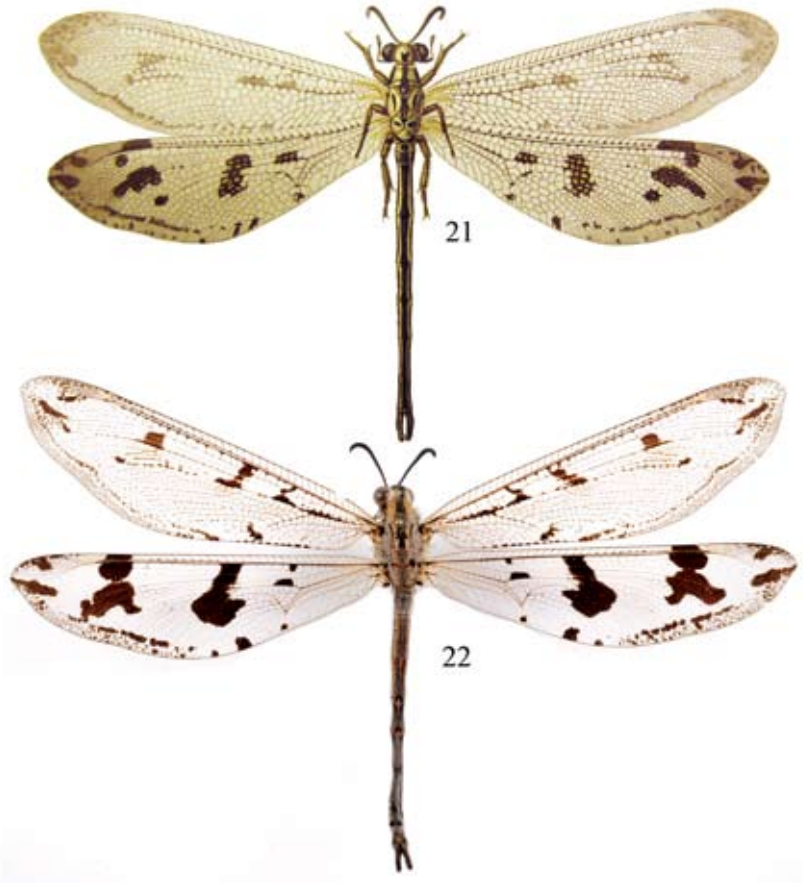
MORTON (1926) had admittedly never seen the species MCLACHLAN (1889) reported from Syria as *P. aeschnoides*. Therefore he showed his specimens to Esben-Petersen, a notable expert of neuropterology of the time, who identified them as *P. hispanus*.

Nevertheless, MORTON (1926) still maintained some uncertainty as his specimens from Palestine were smaller than the well-known specimens of *P. hispanus* found in Spain and Algeria. In the end, he decided to list "*the smaller sized specimens*" from the Middle East under the name of *P. hispanus*.

The current status of the taxon is a valid.

Palpares papilionoides (Klug in Ehrenberg, 1834)
Myrmeleon papilionoides Klug in Ehrenberg 1834 – KLUG in EHRENBERG 1834 (Odescr)
Palpares papilionoides (Klug in Ehrenberg, 1834) – RAMBUR 1842 (Comb), PROST 2010 (Dist)

When describing the species, KLUG in EHRENBERG (1834) presented two figures of the species in his lavishly illustrated monograph written on the Arabian Peninsula. Nevertheless, it is known today that "*Tab. XXXV. Fig. 2.*" actually featured a female specimen with normal wing patterns of *Palpares papilionoides* (as *"Myrmeleon papilionoides"*) (Figs. 19-20) while "*Tab. XXXV. Fig. 3.*" was presented under the name of "*Var. Papilionoides*" (Fig. 20) by KLUG in EHRENBERG (1834). According to HÖLZEL 1982, ASPÖCK et al. 2001 and STANGE (2004) it was conspecific with a male specimen of the later described *Goniocerus klugi* (Kolbe, 1898). The possibility that the two specimens of different sexes and different wing patterns might belong to two different species were discussed on several occasions earlier.



Figs. 21-22: KLUG in EHRENBERG (1834) "*Tab. XXXV. Fig. 3.*" as "*Var. Papilionoides*" (Fig. 21) and a specimen of *Goniocercus klugi* (Kolbe, 1898) (Fig. 22)

First RAMBUR (1842) listed the published figures under different taxa: the male specimen under the name of "*Var. Papilionoides*" was presented as "*Palpares papilionoides*", while the female specimen was specified as "*P. libelluloides*".

WALKER (1853) adopted the species concept of RAMBUR (1842) and noted that the female illustrated in KLUG in EHRENBERG (1834) monograph had uncertain taxonomical status, and designated it as assumed synonym of *P. libelloides* (as "*Myrmeleon papilionoides, Fem. ? fig, Symb. Phys. dec. 4, 2, pl. 35, f. 2.*").

MCLACHLAN (1873) also pointed out that "*P. papilionoides had nothing whatsoever to do with P. aeschnoides*" but he made a mistake.

HAGEN (1887) adopted MCLACHLAN's (1873) opinion regarding the status of species *Palpares papilionoides* (Klug in Ehrenberg, 1834). Therefore, the synonymization of HAGEN (1887) was not taken into consideration in later publication however, it was not denied either.

Later NAVÁS (1911) reported *Palpares papilionoides* from Palestine (Jerusalem, today Israel). MORTON (1926) found the distribution of this species incorrect.

The presently known distribution of the species really does not reach as far as Palestine but it is reported from the southern part of the Arabian Peninsula and from Africa (East and Middle Africa) (ASPÖCK et al. 2001, PROST 2010).

The current status of the taxon is a valid.

Description of a new species

Palpares assyriorum sp. n. (Figs 23-24)

Material examined:

Holotype male: Syria, Prov. As Suwayda, 30 km SE As Suwayda 15 km E of Bosra Salkhad 32°29,686'N; 36°39.050'E 1211m 21.05, 2007 Leg. Rozner, I, Rozner, Gy. & Rozner, Ib.

Paratypes 5 males and 2 females as holotype, 2 males Jordan NW Jarash Burma env. Al Huna 15.05.2010. leg. Snížek; male or female Jordan SW S of At Tafila 12.05.2010 leg. Snížek. Holotype and paratypes are deposited in the entomological collection of Somogy County Museum, Kaposvár; 1 male [SE Turkey] /white label: Enyusek/ /white label: aeschnoid. Klapálek/ /white label: MNCN_Ent Nº Cat. 81333 /; 1 male the same / MNCN_Ent Nº Cat. 81334 / in the collection of Museo Nacional de Ciencias Naturales, Madrid, Spain; 1 female Israel Camp Ziouani en. Ziwan (Gollan hills) III-IV. 1996 leg. R. Rosa" „P. aeshnoides Ill. [sic!] det. Krivokhatsky in the collection of the Upper Silesian Museum (USMB) Bytom, Poland

Head: Vertex shining black, strongly arched and rectangular shape in frontal view; top of vertex yellow with shining black median strip and two small lateral black spots; decumbent and pale hairs on vertex. Frons shining black with short and pale hairs. Gena, clypeus and labrum yellow with short ochreous hairs. Mandible yellow with black apex. Maxillary palps long, shining black. Labial palps brown. Eye brown. Antenna 6-6.5 mm long. Scape shining black with rigid outstanding and black hairs, pedicel black with narrow yellow margins, flagellar segments and club dark brown.

Thorax: Pronotum wider than long, anterior and posterior margins flexed upward with pale hairs, yellow with wide and black median strip. Black pattern spreads along shallow transversal inflection. Lateral margin black. Mesonotum shining black with dense medium long and pale hairs. Metanotum shining black with dense medium long and pale hairs. Two yellow spots on metascutum. Sides dark with dense medium long and pale hairs. Mesopleuron with soft dense and white hairs.

Legs: Coxae black with dense pale hairs. Femora shining black with rigid and black bristles and short white hairs. Tibiae slightly shorter than femora. Tibiae yellowish brown dorsally, black ventrally and with stiff and black bristles. Tarsal segments 1-4 subequal; segment 5 as long as segments 1-4 combined. Tarsi black with stiff and black setae. Tibial spurs as long as segment 1-2 together. Tibial spurs and claws brown.

Wings: Fore wing: 39 mm long, 14 mm wide. Hind wing: 38 mm long, 13 mm wide. Membrane transparent with large and small brown spots. Venation yellow but brown in spotted areas. Pterostigma indistinct pale yellowish. Male with pillula axillaries.

Abdomen: 27 mm long. Tergite yellow with large black pattern. Hairs on tergite 1-3 medium long soft and pale and on other tergites short black. Sternites shining black, margins yellow with short and white hairs.

Genitalia: Male. Ectoproct with postventral processus (Figs. 25-26. and 29-30.). Processus divided by inner angle (iame – inner angle of male ectoproct) into two unequal parts. Proportion of proximal part of processus considerably shorter than distal part. Shape of gonarcus and parameres complex as in Figs. 31-33.

Paratype females: (Figs: 13 and 23)

Forewing: 29-30 mm long, 7 mm wide. Hind wing: 27-28 mm long, 6.5 mm wide; abdomen 19-20 mm long. Females slightly larger than males. Wings wider than those of males. Otherwise like holotype.

Diagnosis: The new species is very similar to those species (*Palpares libelloides*, *Palpares hispanus*, *Palpares chrysopterus*) which live in Eastern Mediterranean. Their areas may overlap partially but based on morphological features they can be distinguished from each other. *Palpares libelloides* and *Palpares chrysopterus* are significantly larger than the new species. The hind wing spots and bands of *Palpares libelloides* are much smaller and light brown (Fig. 37), while the same spots of *Palpares chrysopterus* are larger and dark brown (Fig. 38). The hind wing spots and their colour on hind wing of *Palpares assyriorum* sp. n. (Fig. 40) are similar those of *Palpares chrysopterus*.

Table 1: Comparative matrix for species of *libelloides*-group

Features	*P. libelloides*	*P. chrysopterus*	*P. hispanus*	*P. assyriorum sp.n.*
frons	brown and yellowish	dark brown to black	shining dark brown	shining dark brown
size	large	very large	medium	small
length of FW (mm)	male: 52-58 mm	male: 54-56 mm	male: 45-55 mm	male: 38-45 mm
	female: 55-60 mm	female: 65-68 mm	female: 50-57 mm	female: 44-48 mm
shape of wing	narrow	narrow	wide	wide
basal brand of FW	missing or small	large	missing or small	medium
marginal spots of HW	few rather large	many	many small	few rather large
subbasal spot of HW	mere a point, not touch to subcosta	large touch to subcosta in a section	large, not touch to subcosta	large, touch to subcosta in one point
pattern of abdomen	longitudinal lines	boardly and transversaly banded	boardly and transversaly banded	boardly and transversaly banded
position of inner angle on male ectoproct	weakly developed	well developed	well developed	well developed

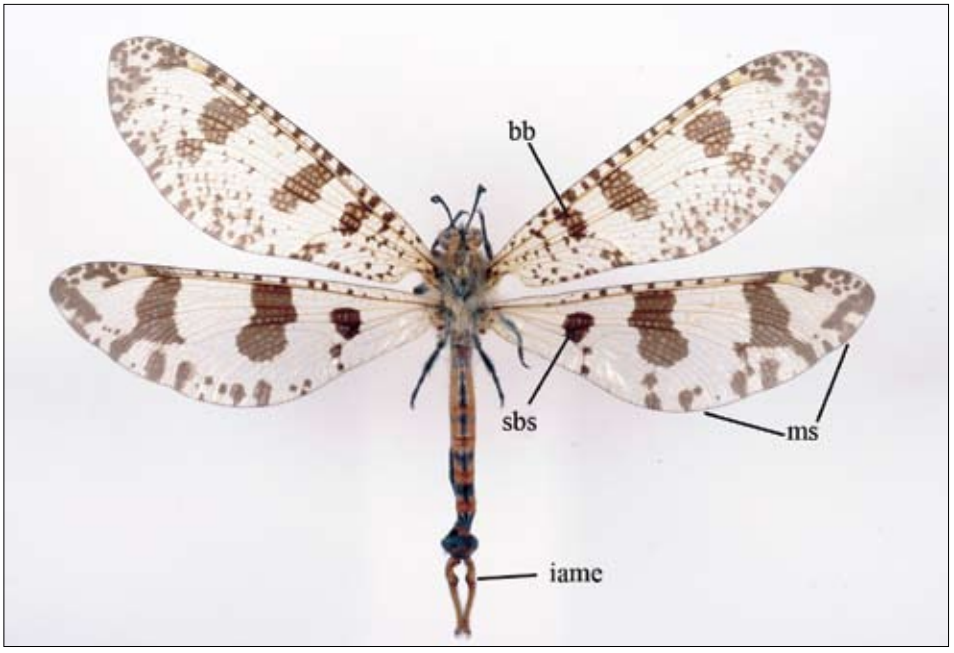
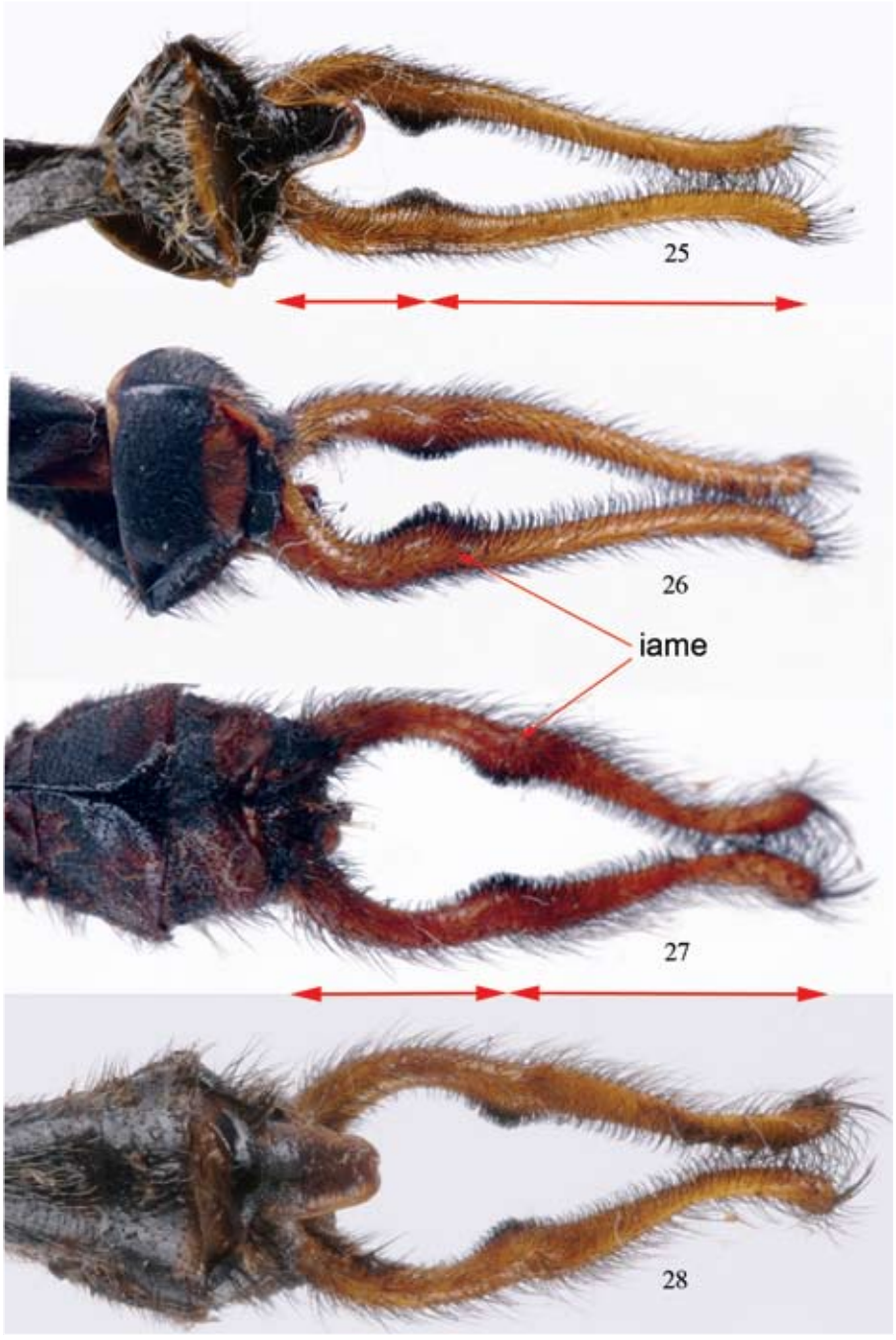
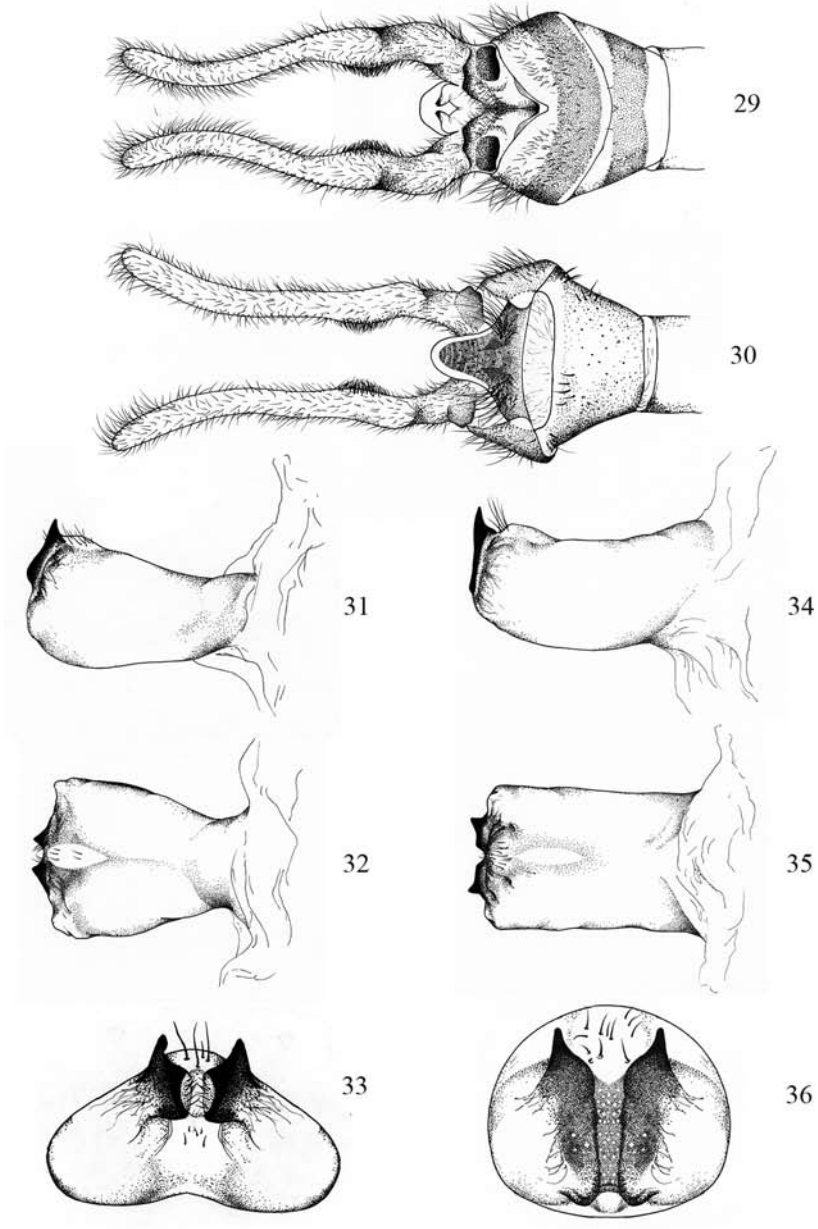


Fig. 23: Holotype male of *Palpares assyriorum* sp. n.
Abbrevations: bb - basal band, ms – marginal spots, sbs - subbasal spot, iame - inner angle on male ectoproct

Fig. 24: Paratype female of *Palpares assyriorum* sp. n.



Figs. 25-28: Male ectroproct of *Palpares assyriorum* sp. n in ventral (Fig. 25) and dorsal views (Fig. 26); Ectroproct of *Palpares hispanus* Hagen, 1860 in dorsal (Fig. 27) and ventral views (Fig. 28) and their dimension compaired to each other showing with red arrows
Abbrevation: iame - inner angle of male ectropoct



Figs 29-36: Apex of male abdomen of *Palpares assyriorum* sp. in dorsal (Fig. 29) and ventral views (Fig. 30), gonarcus and parameres in lateral (Fig. 31), dorsal (Fig. 32) and caudal views (Fig. 33); gonarcus and parameres of *Palpares hispanus* Hagen, 1860 in lateral (Fig. 34), dorsal (Fig. 35) and caudal views (Fig. 36)

After all, the size, pattern and colour of the new species resemble to *Palpares hispanus* (Fig. 39) but it is not yet clear, whether the areas of the two species overlap or not in Egypt. Based on the shape of ectoproct processus males of two speies are easily distinguished. The proximal part of processus of *Palpares assyriorum* (Figs 25-26) is considerably shorter and the distal part of processus is longer than those of *Palpares hispanus* (Figs 27-28). The two species differ in the shape of gonarcus and parameres, too, see Figs. 32-36. To distinguish from each other the females of two species is not easy in many cases, the identification requires several morphological characteristics of co-occurrence examination. The comparative matrix of morphological features (Table 1) helps the identification.

In the Eastern Mediterranean *Palpares geniculatus* Navás, 1912 especially the female is also similar to above mentioned species but it is easily distinguished on the shape of apical spot of hind wing and abdomen pattern.

Since the large morphological similarities among species are present, there are numerous misidentified specimens in the faunistical data (eg. STITZ 1912, PONGRÁCZ 1923) to which KRIVOKHATSKY (2011) also called the attention.

Distribution and re-examined specimens

Palpares speciosus (Linnaeus, 1758)

General distribution: Africa: South Africa (Mansell 2002)

Examined material: In coll Somogy County Museum, Kaposvár: RSA. Transval near Tshipise 1999. 01. 19. Leg: Werner; 1♂; RSA Lotnig. R. Kwazulu-Natal 2002. 12.13-14. Leg: Werner; 1♀; RSA Sani Pass Kwazulu-Natal 2002. 12. 11-12. Leg: Werner; 1♀; RSA Weenen Kwazulu-Natal; 2002. 12. 10. Leg: Werner 1♀; RSA Thabazimbi 2002. 11. 16. Leg: Werner; 1♀; RSA 25 km NW of Setlagole WGS 84: 26°05', 524°58'E; 2003. 02. 01-02. Leg: Faugué R.+H. 3♀; RSA Pietersburg 1999. 01. 16. Leg: Werner 3♀;

Palpares libelloides (Linnaeus, 1764)

General distribution: Europe: Spain, South France, Italy, Slovenia, Croatia, Montenegro, Serbia, Albania, Greece, Romania, Bulgaria, Asia: Cyprus, Turkey, Russia (Dagestan), Georgia, Armenia, Azerbaijan, Syria, Israel, NW Iran.

Examined material: In coll Somogy County Museum, Kaposvár: Albania bor. occ. Shkoper env. c. 400m 3. 7. 2000 Dr. R. Fenci Lgt.2♀; Armenia Garni 1200m 2001.06.28. I. Pljushtch leg. 1♂; Armenia Hojan 1152m N40°17.509'; EO44°14.472' 2007.06.30. Leg: Ilniczky S. 1♂; Bulgaria Topolita 1983.07.23. Leg: Ábrahám L. 2♂ 3♀; Bulgaria Micurin 1982.10.07. Leg: Charvát 1♂; Bulgaria Kresna 1988.07.08. Leg: Hácz T. 1♀; [Bulgaria] Szandanszki [Sandanski] 1983.04.03. Leg: Holl 1♂; Croatia Ninski Stanovci 40m 2004.07.14. Leg: Ábrahám L. 3♂ 6♀; Croatia Ston 2002.06.20. Leg: Haltrick A. 1♀; Croatia Ninski Stanovci 40m 2004.07.14. Leg: Ábrahám L. 8♂ 9♀; Croatia Istria Penisula Rakalj 2001.06.21. Leg: Ábrahám L. 1♂; Croatia Trogir Leg: Or.J.Romsauer 2001.06.21. 2♀; [Croatia] Krk sziget [island] 1995.26.15. 1♂; [Croatia] Yugoslavia Pećane 1988.07.02. Leg: Ábrahám L. 2 ♀; [Croatia] Yugoslavia Karlobag 1988.07.05. leg: Ábrahám L. 1♂ 1♀; [Croatia] Yugoslavia Pol. Deljesac Zuljana 1987.07.06-23. B. Makovsky Lgt. 1♂; Cyprus Larnaka 1986.07.10. 1♀; Cyprus Afluin 1998.10.05. Ferucsik 1♂; Greece Meteora körny. [evr.] 1991.07.14. Leg: Sipos I. 1♂; Greece N car Andiuistra 2003.06.29. Leg: Garai A., Gyulai P. 1♀; Greece Pelopones Arkadia 3km of Kapsia 2003.06.25. Leg: Garai A., Gyulai P. 1♀; Greece Andikira 200m 1997.06.14. Leg: Ábrahám L. 4♂ 2♀; Greece Andikira 200m 1997.06.15. Leg: Ábrahám L. 1♀; Greece Thessalia Meteora 2003.06.29. Leg: Garai A., Gyulai P. 1♂; Greece Thermopülai Emlékmű [Thermopiles] 2001.06.19. Leg: Pintér A. 1♀; Greece Rhodos Kolumbia 2005.06.23. Leg: Haltrich A. 1♂; Greece Asplovalta 1977.06.17-19. Leg: Podlussány I. 1♀; Greece Sunlon Attika 1981.05.10. Leg: Podlussány 1♂; [Greece] Hellas Leptokaria 1992.06.30. Leg: L. Balásházy 1♂; [Greece] Hellas Preveza 1992.06.12. Leg: Slachta 1♂ 1♀; [Greece] Hellas Litochoro 1992.07.29. 1♂; Iran Prov. Zangan [Zanjan] Mt.Kühha-ye Tales Gilvan 2000.06.16. leg: Gaskó K. 2♀; Iran [Prov. Lorestan] Quir előtt 15km Firuzabad fele szél:28°-30° hossz:52°-54° 2004.04.12. Leg: Hácz T., Benedek B. 1♀; [Macedonia]

Fig. 37: Male wing of *Palpares libelloides* (Linnaeus, 1764) from Croatia

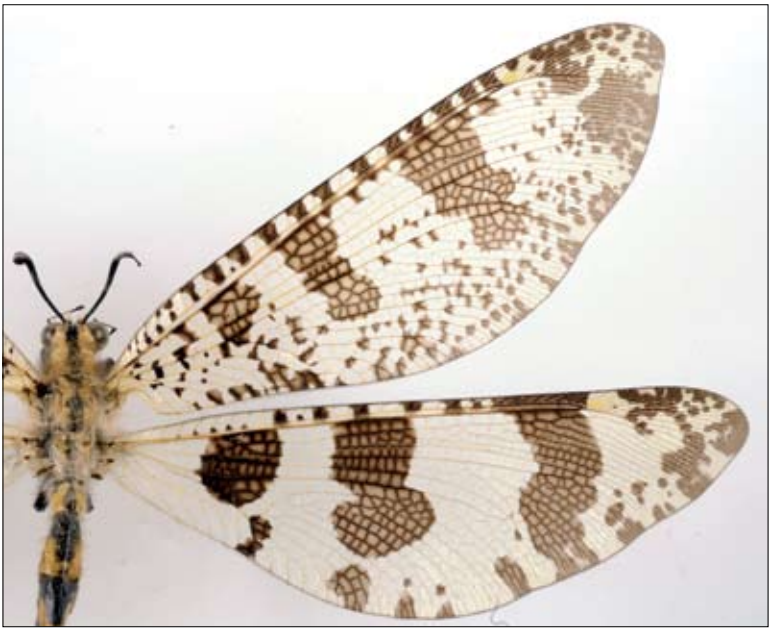


Fig. 38: Male wing of *Palpares chrysopterus* Navás, 1910 from Iran

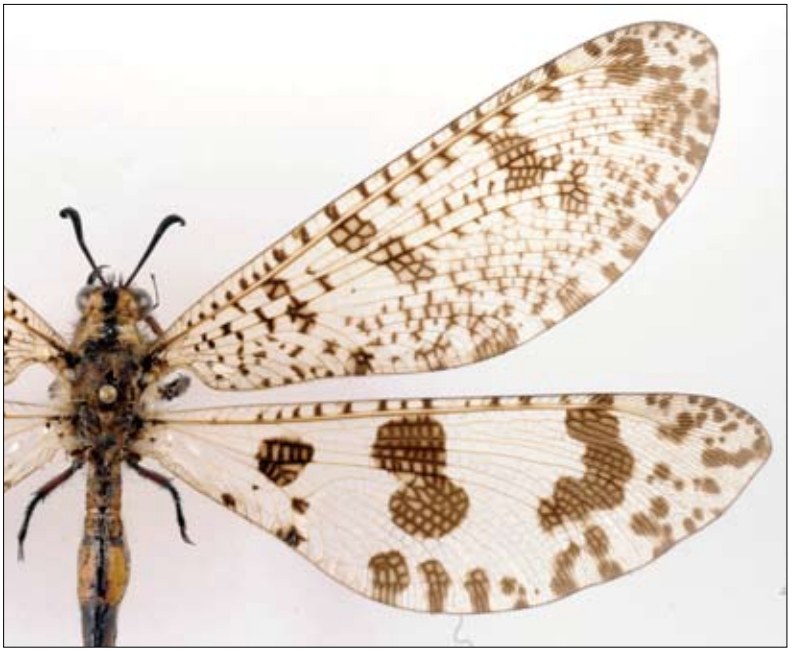


Fig. 39: Male wing of *Palpares hispanus* Hagen, 1860 from Spain

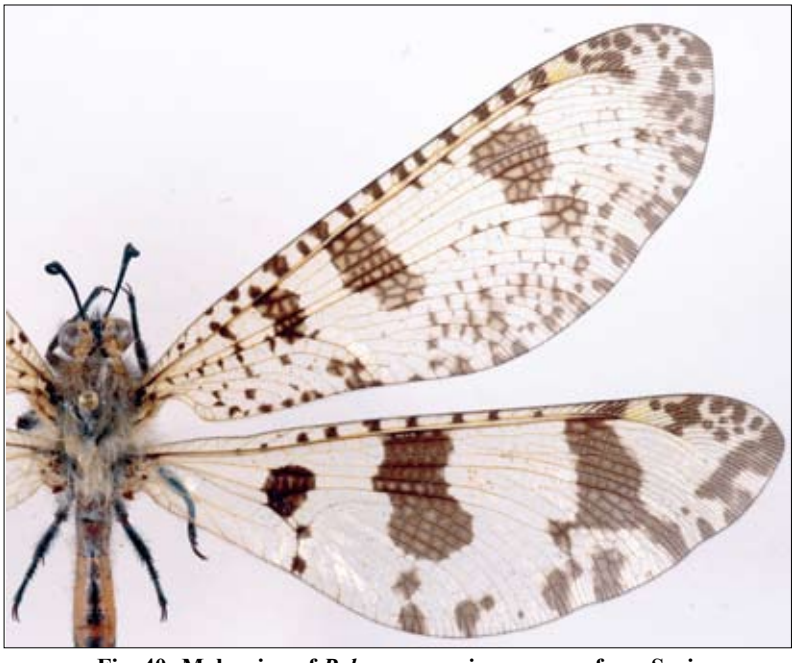


Fig. 40: Male wing of *Palpares assyriorum* sp. n. from Syria

Demir Karpija 1986.06.16. Nagy Lóránt 1♂; Macedonia Yugoslavia Titov Veles 1990.07.13. Leg: Kalalza 1♂; Syria Prov. Hama near Salamiyeh 35°03.928'; 36°57.266' 490m 2007.06.03-04. Leg: Rozner I., Rozner G., & Rozner lb. 1♂ 1♀; Syria 25km SW of Ariha 2km S of Al Bara H 35°39.017'; 36°32.911' 626m 2007.05.31-06.02. Leg: Rozner I.,Rozner G. & Rozner lb 1♂; Syria 35km SE of Tartus 34°43.213'; 36°13.206' 229m 2007.05.26. Leg: Rozner I., Rozner G. & Rozner lb 1♀; Turkey Yenikög 1994.06.12. 1♂; Turkey Prov. Elazig Hazar Gölü 1200m 1994.05.14. Leg: Gaskó Kálmán 1♀; Turkey Prov. Elazig Hazar Gölü 1994.04.07. Leg: Ábrahám L. 8♂ 2♀; Turkey Prov. Malatya valley Göksu S of Erkenek 1994.03.07. Leg: Gyulai P. 11♂ 11♀; Turkey Prov. Ankara Bagcilar 1994.07.12. Leg: Ábrahám L. 4♀; Turkey [Prov. Ankara] Tuz Gölü 1994.06.09. Leg: Gaskó K. 3♂ 1♀; Turkey near Ergidir 2001.08. Leg: Varner 1♀; Turkey Prov. Urfa Halfeti Euphrat river 1994.07.02-03. Leg: Ábrahám L. 1♂; Turkey [Prov. Ankara] Tuz Gölü 20km NW of Sereflikochisar 1994.07.01. Leg: Ábrahám L. 1♂ 2♀; Turkey Prov. Elazig 30km SE of Elazig Hazar-Gölü 1200m 1995 05.14. Leg: Fábián Gy. 1♂; Turkey Prov. Urfa valley of Euphrat 500m 8km N of Halfeti 37°35'E; 37°13'N 1990.05.25. Leg: Szabóky Cs. 1♂; Turkey [Prov. Aydin] Kusadasi 1977.05.03. Leg: Podlussány 1♂; [Turkey] Silrfle Tr. 1992.06.14-16. Leg: Juhász Cs. 1♀.

Palpares chrysopterus Navás, 1910

General distribution: Asia: Armenia, Israel, Syria, SE Turkey, W Iran.

Examined material: In coll. Museo Nacional de Ciencias Naturales, Madrid:

Lectotype male: white label: / Palpares chrysopterus Nav. ♂ /; white label: / Persia, Bazouft, Haut Karoum, VI-1899, Escalera/; white label: / Cotypus / red label: / MNCN_Ent Nº Cat 12279 /; red label: /Lectotype male: Palpares chrysopterus Navás, 1910 Designated: Ábrahám L. /

Paralectotypes: female / MNCN_Ent Nº Cat 81327; Persia, Bazouft, Haut Karoum, VI-1899, Escalera // visto or Klapalek / red label: /Paralectotype female: Palpares chrysopterus Navás, 1910 Designated: Ábrahám L. /; female / MNCN_Ent Nº Cat 81328; Persia, Bazouft, Haut Karoum, VI-1899, Escalera / red label: /Paralectotype female: Palpares chrysopterus Navás, 1910 Designated: Ábrahám L. /; female / MNCN_Ent Nº Cat 81329; Persia, Bazouft, Haut Karoum, VI-1899, Escalera // visto por Klapalek / red label: /Paralectotype female: Palpares chrysopterus Navás, 1910 Designated: Ábrahám L. /; female / MNCN_Ent Nº Cat 81330; Persia, Kouh Sefid, Haut Karoum, VII-1899, Escalera / red label: /Paralectotype female: Palpares chrysopterus Navás, 1910 Designated: Ábrahám L. /; male /MNCN_Ent Nº Cat 81331; Persia, Bazouft, Haut Karoum, VI-1899, Escalera // red label: /Paralectotype male: Palpares chrysopterus Navás, 1910 Designated: Ábrahám L. /; female / MNCN_Ent Nº Cat 81332 Chindaar, Escalera // visto or Klapalek // red label: /Paralectotype female: Palpares chrysopterus Navás, 1910 Designated: Ábrahám L. /.

In coll Somogy County Museum, Kaposvár: Armenia Udjin 2009. 06.27. leg.: Ilniczky S. 1♂; Armenia Azat Res. N40°11'0" E45°52'0" leg.: Ilniczky S. 1♀; Iran Prov. Esfahan vill. Miyandast 2000.06.20. Leg: Gaskó K. 1 ♀; Iran Prov. Esfahan Qusmar (Quaz An) 1772m N33°44.425' E51°28.905' 2005.07.06. Leg: Ábrahám L. 1♀; Iran Prov. Esfahan Fereidun Shar 2700-3000m 2006.07.10-12. Leg: Hácz T. 1♂ 1♀; Iran Prov. Esfahan Asgaran 2714m N 32°55.262' E 50°56.643' 2005.06.27. Leg: Ábrahám L. 5 ♂ 2 ♀; Iran Prov. Fars Dehdib 2000. 06. 22. leg: Rozner Gy. 1♀; Iran Prov. Hamadan Nehavend 1851m N34°02.756'; E48°22.614' 2005.06.26. Leg: Ábrahám L. 2♂ 3♀; Iran Prov. Hamadan Zagros Mts 25km W Khakadan N48°20'30"; E34°2'53" 2200m 2000.06.21. Leg: Fábián Gy. 1 ♂ 2♀; Iran Prov. Kordestan Faqih Soleyman N35°05.085'; E46°54.118' 2005.06.25. Leg: Ábrahám L. 1♀; Iran Prov. Kordestan (Mt) Kühha-ye Zagros Kamyaran 2000.06.17. Leg: Rozner Gy. 1♀; Iran Prov. Lorestan (Mt)Kühha-Ye Zagros 25km S of Dorud Sepiddast 2005.06.20-21. Leg: Rozner Gy. 1♂ 1♀; Iran-occ. Prov. Lorestan Zagros Mts Dorud 2500-3000m 1999.06.19-21. Leg: L. Liber 1♀; Iran-mer.occ. Fars prov. 2500m Zagros Mts Dosht Arzhan 1999.06.08-10.Leg: L. Bieber 1♀; Iran Prov. Tehran Mt. Elbrus Sharak 1800m 2000.07.02. Leg: Hácz I., Kőszegi G. 2♂ 11♀; Iran Prov. Yazd Mazra Ehye Tagi 2582m N31°34.949'; E53°49.387' 2005.07.04. Leg: Ábrahám L. 5♀; Iran Prov. Zangan Zanjan 2300m 2000.07.01. Leg: Hácz T. Kőszegi G. 4♂ 4♀; Iran Prov. Zangan Lar 1021m N36°48.333'; E48°54.881' 2005.06.24. Leg: Ábrahám L. 2♂, 2♀; Iran Prov. Zangan Gollieh 2125m N° 42.288' E 48° 45.287 2005.06.24. Leg: Ábrahám L.1 ♂; Iran Prov. Zangan Mt. Kühha-ye Tales Gilvan 2000.06.16. Leg: Gaskó K. 2♂; Israel Tel Aviv 2010. 06. 1♀; Turkey Prov. Bitlis Kusgunkiran Gecidi 2300m N42°46'; E38°17'N 1989.07.22-23.Leg: Gyulai M. Hreblay 1♀; Turkey Prov. Bitlis-van Kusgunkiran Gecidi 2400-2500m 42° E38°17'N 1988.08.02. Leg: Gyulai Hreblay Ronkay et Ronkay 1♀; Turkey Prov. Tunceli Muzur Daglari 11km m Ne of Tunceli Munzur Vadisi Mili Park 1050m 2005.07.31. Leg: Csővári.T. coll Csővári Tibor 2♂ 2♀; [Turkey] Turquie [Prov. Sivas] Gürün 1989.07.07. Leg: P. Marosi 1♀; Turkey Prov. Sivas 5km W of Gürün 1500m 37°12'5 38°45' N 1988.08.28. Leg: Gyulai, Hreblay, Ronkay et Ronkay 1♂; Syria occ. muh. Al.

Ladhgiyah Mts Ansariya Salahad Din Citadel N35°35.828' E30°03.278' 360m 2006.06.24. Leg: N. Rahné, A. Kotán, A. Márkus, D. Szalóki & K. Székely 1♀.

Palpares hispanus Hagen, 1860

General distribution: Europe: South Spain, Portugal, Africa: Morocco, Algeria, Tunesia, Libya, Egypt.

Examined material: In coll Somogy County Museum, Kaposvár: Morocco 3km from Chafarni 1519m N30°50'04.08"; W08°22'40.5" 2008.06.29. Leg: Ábrahám L., Bognár L., Nagy L.3 ♀; Morocco 5km N from Danger 947m Reserves de Granka Chasse Interdite N31°32'36.7"; W07°32'21.2" 2008.06.28. Leg: Ábrahám L., Bognár L., Nagy L. 1♂; Morocco 5km N from Danger 947m Reserves de Granka Chasse Interdite N31°32'36.7"; W07°32'21.2" 2009.06.22-23. Leg: Ábrahám L., Malgay V., Szalóki D. 1♂; Morocco Tiz-n Tichka 2089m N31°18'26.7"; W07°22'38.8" 2008.07.03. Leg: Ábrahám L., Bognár L., Nagy L. 3♂ 6♀; Morocco Tiz-n-Tichka 2089m N31°18'26.7"; W07°22'38.8" 2009.07.03-04. Leg: Ábrahám L., Malgay V., Szalóki D. 5♂ 13♀; Morocco 5km from Anezol 1533m N30°47'21.72"; W07°17'59.1" 2008.07.02.Leg: Ábrahám L., Bognár L., Nagy L. 1♀; Morocco 5km from Anezol 1533m N30°47'21.7"; W07°17'59.1" 2010.06.10. Leg: Ábrahám L., Kisbenedek T., Vágner L. 1 ♂; Morocco 2km from Imini 1434m N31°05'07.4"; W07°17'30.4" 2009.06.24. Leg: Ábrahám L., Malgay V., Szalóki D. 3♂ 3♀; Morocco Erg Hamada Mhamid 573m N29°50'51.9"; W05°35'41.8" 2009.06.27. Leg: Ábrahám L., Malgay V., Szalóki D. 11♂ 10♀; [Morocco] Meknes Tanger 1992.07.06. Maroko Lgt: Mrácek 1♀; [Spain] Mellila Spanien Afrika 1909.06. Arres 1♂; [Spain] Los Barrios, Sierra de Ojén (Cádiz) Hispánia 1991.06.28. Leg: J. Vives 1♂ 1♀; [Spain] Hispánia Algeciras 1978.06.18. Leg: Cs. Juhász 1♀.

Palpares assyriorum sp. n.

General distribution: Asia: Syria, Jordan, Iran, Turkey, Israel, Africa: Egypt (?).

Examined material: see the description.

Palpares papilionoides (Klug in Ehrenberg, 1834)

General distribution: Asia: Saudi Arabia, Yemen, Africa: Cameroon, Ethiopia, Kenya, Niger, Senegal, Somalia, Sudan, Uganda, Tanzania.

Examined material: In coll Somogy County Museum, Kaposvár: Ethiopia 1380 m Arba Minch E 037°32'54"; 2010. 04. 25. Leg: Ströhle 1♀; Ethiopia Negele Borena 2002. 05. 14. Leg: Werner 3♀; Kenya near Garissa 2000. 05. 12. Leg: Werner et Lizner 1♂ 3♀; Kenya near Mwingi 2000. 05. 04. Leg: Werner et Lizner 5♂ 15♀; Kenya E. Prov. Hola 2000. 05. 05. Leg: Werner et Lizner 1♂ 11♀; Kenya E. Prov. Hola 2000. 05. 09-10. Leg: Werner et SMRZ 1♂; Kenya El Wak 2001. 05. 01-03. Leg: Werner et SMRZ 3♂, 1♀; Kenya SE SW of Voi 2010. 12. 08. Leg: Snizek 1♀; Kenya Garissa 15 km S of Bura 2011. 29.4 lgt: Snizek 1♂ 1♀; Kenya Garissa 40 km N of Bura 2011. 29.4 lgt: Snizek 6♂

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A new *Visca* sp. from Madagascar (Neuroptera: Myrmeleontidae)

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Ábrahám, L. Dobosz, R. & Trýzna, M.: *A new Visca sp. from Madagascar (Neuroptera: Myrmeleontidae).*
Abstract: *Visca silvaticus* sp. n. is described from Madagascar and compared to other Malgassan endemic *Visca* Navás, 1927 species. A key for *Visca* species is also given. With 7 figs.

Keywords: new species, Visca, ant-lion, Myrmeleontidae, Madagascar

Introduction

Madagascar with many endemic taxa is a diversity hotspot all over the Earth since it was separated from the African continent many millions years ago. Its geographical position, the diversity of the habitats, the climate and long time isolation resulted rapid speciation of organizms.

It is also true for the ant-lion fauna: approximately half of the known species are endemic. There are also several endemic genera such as: *Doblina* Navás, 1927, *Visca* Navás, 1927 and *Voltor* Navás, 1935 in Madagascar.

Last year, Ábrahám and Dobosz (2011) published a paper on the ant-lion and owl-fly fauna in which two new *Visca* species were described. Up to that time, two valid *Visca* species (*V. mutila* Auber, 1955, *V. venustulus* Navás, 1927) were known and listed by Stange (2004) in his ant-lion world systematic catalogue. In the latest time, many zoological expeditions visited to Madagascar to survey the natural values. These results of neuropterological research works were published in some papers (Navás 1927, Auber 1955, Penny 2003) and recently, some websites with the data of neuropterans were compiled (Penny 2006, Hošek ?)

One of the authors, namely Miloš Trýzna regularly visited to Madagascar to study the endemic insect fauna. After publishing the paper (Ábrahám and Dobosz 2011) on Madagascan ant-lion fauna, a new *Visca* sp. n. was captured during his late expedition in 2011. Now we describe it below.

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Taxonomical part

Visca silvaticus Ábrahám & Dobosz sp. n. (Fig. 1)

Material examined:
Holotype female: Madagascar CE 2011, border of Andasibe NP 916m, „Parc de Orchidées, 27.xi. S18º55′59.9″ E048º24′46.5″ at light M. Trýzna & loc. coll. lgt.
Holotype is deposited in the entomological collection of Upper Silesian Museum, Bytom, Poland.

Head: Vertex arched, yellow with two transversal bands (Fig. 2). Anterior band black, posterior band light brown on top of vertex. Yellowish epicranal suture visible. Short sparse black hairs on top of vertex otherwise hairless. Indistinct light brown area above scapes. Frons shining light brown, hairless (Fig. 3). Part of gena next to frons shining brown other part of gena next to eye yellow and hairless. Clypeus wrinkled transversally, yellow with sparse pale hairs. Labrum yellow with sparse shining and pale hairs curved to mouthpart. Mandible yellow with brown apices and black inner margin. Maxillar and labial palpi yellow with black hairs. Eye large. Scape with wide shining black basal half ring on ventral side but dominantly yellow on dorsal side and with short sparse and black hairs. Pedicel with wide shining black basal ring and narrow yellow distal margin. Flagellar segments dominantly black ventrally, yellow dorsally. Club light brown. Segments with sparse black hairs.

Thorax: Pronotum 2.5 times longer than wide, light brown with yellow lateral margin (Fig. 2). Two dark brown marks on each side along transversal sutures. Pronotum with sparse moderately long and brown pubescence but pale hairs on lateral margin. Mesonotum, prescutum light brown with black anterior margin and medium long sparse and pale hairs. Scutum yellow with distinct black lateral mark, scutellum also yellow with black spot anteriorly. Metanotum yellow with black pattern laterally. Meso- and metanotum with short sparse and pale hairs, almost bare. Sides yellow with triangular-shaped black mark right under fore wing and with short pale hairs.

Legs: Very long. Coxae yellow with white hairs. Trochanter yellow. Femora yellow with numerous brown dots and short black hairs. Tibiae slightly shorter than femora, yellow with wide black ring proximally and also numerous brown dots (some brown suffusion on middle leg distally) and with short sparse brown hairs. Tibial spurs absent. Length of tarsal segment 1-4 unequal, gradually decreasing. Tarsal segment 1 somewhat shorter than segment 5. Tarsus yellow with short brown hairs, tarsal segment 3-4 with black distal ring. Tarsal segment 5 with ventral setal brush. Claws opposable, shining light reddish-brown.

Wings: Fore wing 35 mm long and 9 mm wide. Hind wing 35 mm long and 8 mm wide.

Fore wing elongated with rounded apex, anal area slightly concave obtuse. Costal area wide. Membrane transparent with brownish shadow (Fig. 1) and with long setae. C, M, and anal veins yellow, other longitudinal veins yellow interrupted with black at intersections of cross veins. Most cross-veins yellow. Pterostigma distinct yellowish white with 6-8 cross-veins. 8-9 radial cross-veins in front of origin of Rs. CuP+A1 parallel with hind margin. Membrane with brown shadow at meeting point of Cua2 and CuP+A1 as well as along gradient veins and along cross-veins beyond pterostigma.

Hind wing with small light shadows along cross-veins in apical sector. Pterostigma distinct yellowish white with 3-4 cross-veins. Most longitudinal and cross-veins yellow. 2 radial cross-veins in front of origin of Rs. Two rows of cells between CuP2 and hind margin.

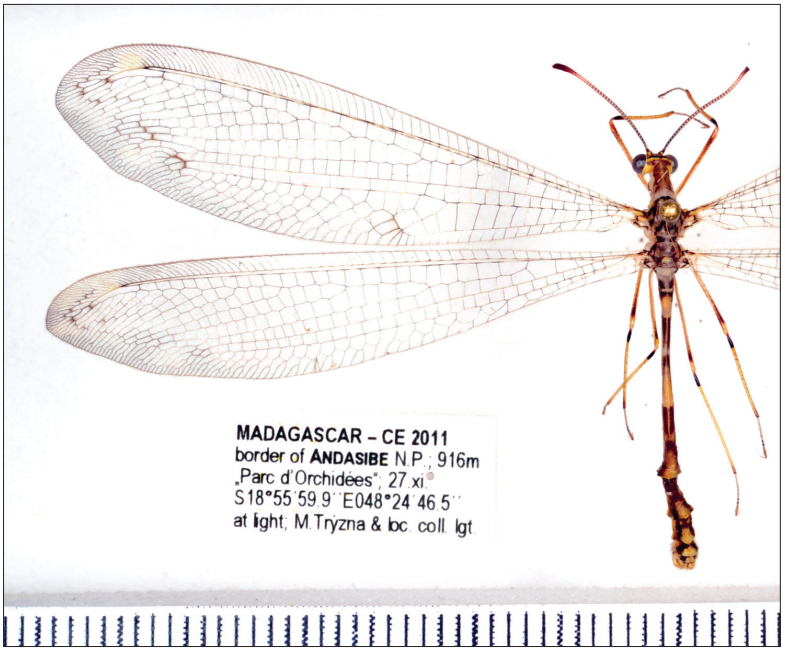


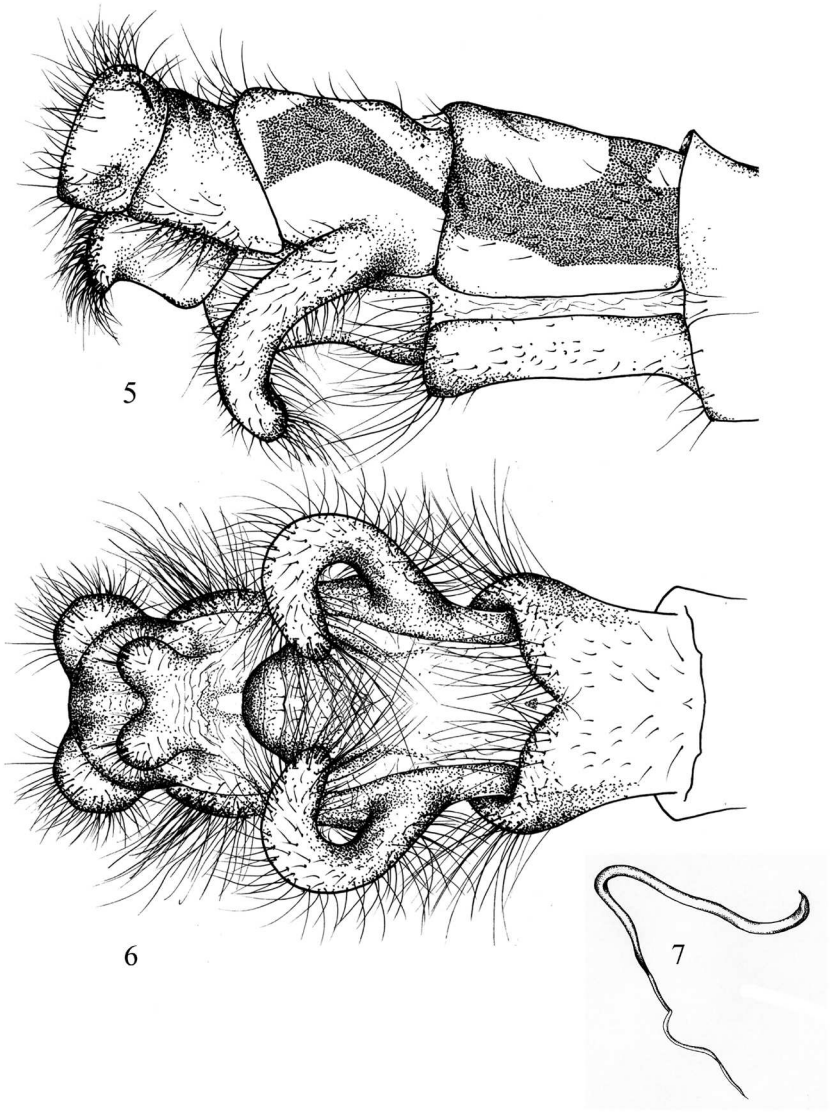
Fig. 1: Habitus of *Visca silvaticus* sp. n.

Fig. 2: Vertex and prontum of *Visca silvaticus* sp. n. in dorsal view

Fig. 3: Head of *Visca silvaticus* sp. n. in frontal view

Fig. 4: Apex of female abdomen of *Visca silvaticus* sp. n. in lateral view

Abdomen: 22 mm long, shorter than wings. Tergite 1-2 short, brown, other tergites dominantly yellow with large brown marks and with very short pale and brown hairs. Sternites yellow with very short dominantly pale hairs.



Figs. 5-7: Female genitalia in lateral (Fig. 5), ventral view (Fig. 6) and spermatecha in lateral view (Fig. 7)

Genitalia: Female genitalia as in Fig. 4 and 5 in lateral view and the same as in Fig. 6 in ventral view. Tergite 9 semicircle-shaped, yellow with brown mark, sparse brown hairs dorsally and dense pale hairs ventrally in lateral view. Ectoproct rather rectangular shaped, yellow with dense pale hairs on ventral and caudal margins. Posterior gonapophysis well developed curved inwardly with long dense pale hairs. In ventral view sternite 7 with two lateral rounded lobes and with long pale hairs on caudal margin. Pregenital plate small, weakly chitinised. Spermatecha as in Fig. 7. in lateral view.

Fig. 8: Habitat of *Visca silvaticus* sp. n., the edge of the rainforest in Andasibe National Park, Central East Madagascar; photo: Petr Baňař

Male: Unknown.

Diagnosis: The new species is a medium sized *Visca* sp. *Visca magnus* Ábrahám, 2011 is considerably larger (the length of fore wing 44 mm) while *Visca murzini* Ábrahám, 2011 is smaller (the length of fore wing 20 mm) than the new species. There are three medium sized *Visca* species live in Madagascar. It is easily distinguished from *V. venustulus* which has only one row of cells between CuP2 and hind margin in the hind wing while *V. mutila* and *V. silvaticus* have two rows. However, *V. mutila* has different pronotal pattern than that of the new species (Fig. 2).

Remarks: The specimen was captured on a small open area (ca. 60x100m) surrounded with a semideciduous rainforest where the dominant trees were Lauraceae and Rubiaceae. The vegetation was very diverse and rich in species especially at the edge of the forest (Fig. 8). The new species was recorded at light (160 W mercury bulb, HLMI type) during evening period (from 8 to 11 pm) when the temperature was about 25 °C and no rain at all.

Key for Visca species

Abbreviations: FW – Fore wing, HW – Hind wing, CuP – Cubitus posterior

1. Large species, length of FW larger than 40 mm; 3 radial cross-veins before origin of Rs, usually 3 rows of cells between CuP2 and hind margin in HW.....***V. magnus***
- Smaller species, length of FW less considerably, between 20-36 mm…….……2
2. Small species, length of FW about 20 mm, membrane of FW with three dark rounded spots, 1 radial cross-veins before origin of Rs in HW.....…..……..***V. murzini***
- Medium sized species, length of FW between 25-36 mm ……....…..3
3. Length of FW about 32-36 mm, usually 2 rows of cells between CuP2 and hind margin in HW.....4
- Smaller, length of FW about 28 mm, only one row of cells between CuP2 and hind margin in HW……..……..……...***V. venustulus***
4. Length of FW about 35 mm, pronotum dominantly brown with two lateral yellow bands..……..……...…***V. silvaticus*** sp.n.
- Length of FW about 33 mm, pronotum dominantly yellow with brown lateral bands.....……...…….……***V. mutila***

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We would like to thank to Dr. Lala Harivelo Ravaomanarivo Raveloson (University of Antananarivo, Faculty of Sciences, Department of Entomology) and Dr. Chantal Andrianarivo (Madagascar National Parks) for supporting our research project: 'Étude à long terme de la biodiversité des groupes choisis d'insectes (Coléoptères, Hétéroptères, Lépidoptères et Homoptères) dans les localités préalablement sélectionnées en considération de la recherche et la protection de la biodiversité dans les aires protégées de Madagascar' (project of Miloš Trýzna).

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Appendix

In the paper "ÁBRAHÁM, L., DOBOSZ, D. 2011: Contribution to the ant-lion and owl-fly fauna of Madagascar with description new taxa (Neuroptera: Myrmeleontidae, Ascalaphidae). - Natura Somogyiensis 19: 109-138." the legend of Fig. 5. (125 p.) is wrong but it is correctly: Fig. 5. Habitus of *Visca mutila* Navás, 1927.

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Sawflies from China and Indonesia (Hymenoptera: Tenthredinindae)

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Haris, A.: *Sawflies from China and Indonesia (Hymenoptera: Tenthredinindae).*
Abstract: *Pristiphora* (*Pristiphora*) *achterbergi* sp. nov. and *Busarbia badagongensis* sp. nov. are described from Hunan Province of China. *Siobla maxima* R.E. Turner, 1920 is new record for China. *Abeleses cyanosulawesiensis* sp. nov. is described from Sulawesi, Indonesia and compared to *Abeleses coeruleus* Rohwer, 1916.

Keywords: Hymenoptera; Symphyta; Tenthredinidae; Hunan; China; Indonesia, Sulawesi; New species

Introduction

The present paper is the 9th contribution of the author to the knowledge of the sawflies of China (Haris and Roller 1998, 1999 a,b, 2007, Haris 2000, 2007, 2008, 2009) and 6th to the knowledge of those of the Indonesian-Malaysian Islands (Haris 2000, 2002, 2006, 2007, 2010). The above mentioned Chinese sawflies were described mainly from Yunnan and Gansu provinces. The sawflies of Hunan provinces relatively better studied, due to the activity of the local research group, managed by Professor Meicai Wei, therefore numerous sawflies were described from this province in high number of papers, like Wei and Xiao 2002, He et al. 2005, Wei and Niu 2001, 2004, Huang and Wei 2007, Zhang and Wei 2006, Wei 2004 etc.. The present paper is a small contribution to the knowledge of sawfly biodiversity of the province. From the Indonesian-Malaysian Islands, the number of known sawfly-species is about 110. Although, the identification key for these species was completed in 2006 (Haris 2006), there are still numerous unrecorded species live there.

Material and Methods

This small collection was collected by Professor Cees van Achterberg during his visit in Hunan province between 31. v. and 11. vi. 2009. Some further specimens were collected by Dr. X.-Y. Li, local Hymenopterologist, Braconidae specialist. For the identification, I worked with separate papers, due to the lack of handbook or monograph on the Chinese sawflies with identification keys. These papers are Wei and Xiao 2002, He et al. 2005, Wei and Niu 2001, 2004, Huang and Wei 2007, Zhang and Wei 2006, Wei 2004. etc. For the safe identification, genitalia of the proposed type specimens were dissected and figured. For verification of the new record, the checklist of Wei et al. 2006

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was consulted. The Indonesian sawflies were collected during the expedition of Professor Achterberg in 1991. It contains 50 specimens of about 20 species, from which 1 is new. The other species will be published separately.

Descriptions

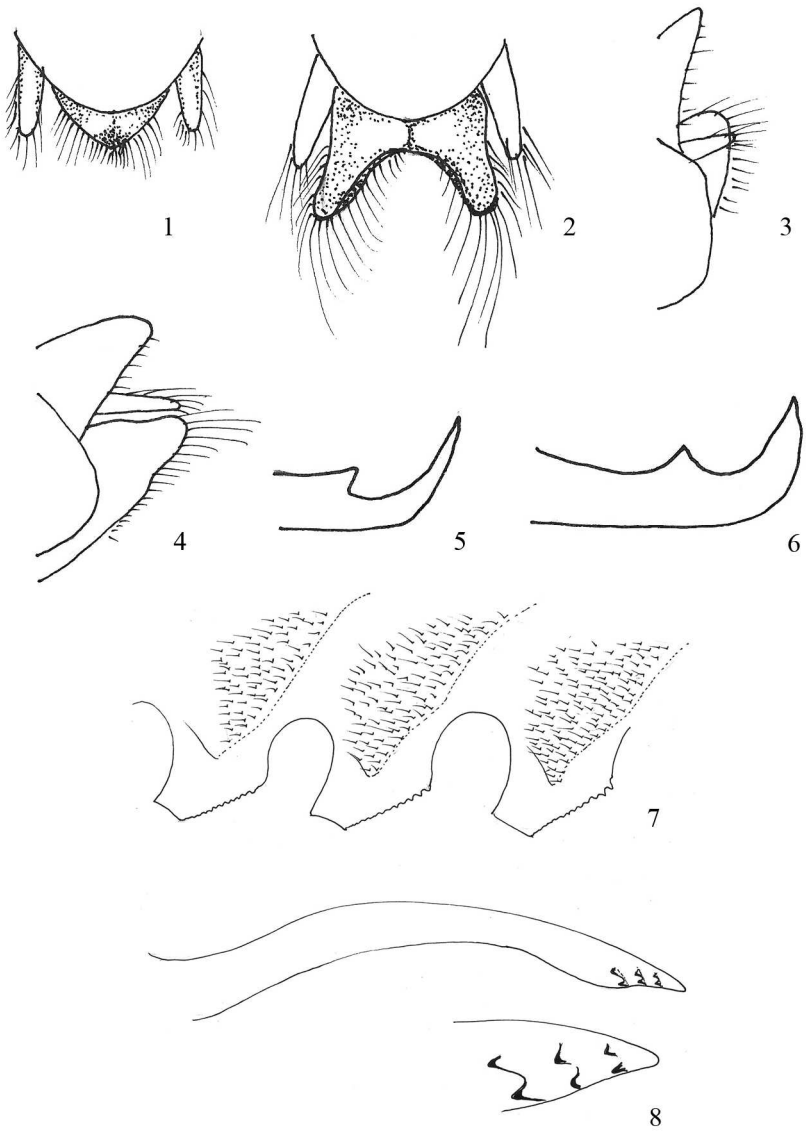
Pristiphora (***Pristiphora***) ***achterbergi*** sp. nov.
(Fig. 2, 4, 6, 7, 11)
Material: Holotype, female (Changsha University): S. China, Hunan, near Zhangjiajie, Badagong Mts., Bamaoxi, 02-03. 06. 2009, 540 m, Cees van Achterberg.

Female (Fig. 11). Head and antenna black, wide apical margin of clypeus, labrum and palpi white. Thorax black, hind margin of pronotum and tegula whitish ocker, parapteron white, cenchri yellowish white. Coxae and trochanters white, femora, tibiae and tarsi yellowish white, apical 2 segments of hind tarsus infuscate. First abdominal tergite (propodeum) black, other tergites dark brown with white hind margins. These hind margins of abdominal tergites widened in middle. Sternites white. Ovipositor white, apical half of valvula 3 black. Wings slightly infuscate. Stigma, costa, subcosta and venation dark brown. OOL : POL : OCL: 7 : 6 : 4. Length : width of postocellar area: 4 : 13. Ratio of antennal segments 1-9: 5 : 2 : 21 : 20 : 19 : 17 : 15 : 15 : 15. Antenna long, about as long as costa and stigma combined. Length of 3rd antennal segment : maximal length of eye: 21 : 18. Postocellar area short, not longer than diameter of an ocellus. Head contracted behind eyes. Occipital carina missing. Frontal area surrounded by week carina. Temples moderately densely punctured with small, shallow punctures, shiny. Other parts of head densely punctured with small, moderately deep punctures, shiny. Clypeus slightly and broadly emarginated, clypeal emargination about 0.25x as deep as middle length of clypeus. Gena about as wide as diameter of front ocellus. Thorax smooth and shiny, only pronotum with dense, small and shallow punctures. Claws with small inner tooth, without basal lobe (Fig. 6). Ratio of hind tarsal segments 1-5: 39 : 18 : 10 : 5 : 11. Length of hind basitarsus : length of inner hind tibial spur: 39 : 19. Ovipositor short, shorter than hind femur as 80 : 51. Length of ovipositor : length of hind basitarsus: 51 : 39. Hind margin of sawsheath (Figs. 2 and 4) deeply emarginated in dorsal view. Number of serrulae: 18. Sides of each serrulae with dense setae directed to basal part of sawsheath. 6th-8th serrulae in Fig.7. Middle serrulae each with 10 small teeth. Length: 5.6 mm. Male unknown.

Etymology: the new species is dedicated to Prof. Dr. Cees van Achterberg, Braconidae specialist, leader of the expedition.

In the key of HARIS (2006) the new species runs to *Pristiphora* (*Pristiphora*) *punctifrons* (Thomson, 1871) having long inner hind tibial spur, apically emarginated sawsheath, entirely pale femora and light sternites. In *P. punctifrons* Thomson tibial apex and hind tarsus dark and clypeus is without wide white anterior margin, costa and stigma are yellow. The new species has wide white anterior margin on clypeus, stigma and costa are dark brown and has white hind tibia and tarsus. The densely covered setae of the lancet on the total surface (except the teeth) also a very specific feature of the new species.

In the recently described Chinese species, the new species similar to *Pristiphora zhejiangensis* Wei, 1995 and *Pristiphora beijingensis* Zhou & Z. Zhang, 1993 having white clypeus but in these species hind femur and apex of hind tibia are extensively black beside the different lancet structure.



Sawsheath in dorsal view Fig. 1: *Busarbia badagongensis* sp. nov., Fig. 2: *Pristiphora* (*Pristiphora*) *achterbergi* sp. nov.
Sawsheath in lateral view Fig. 3: *Busarbia badagongensis* sp. nov., Fig. 4: *Pristiphora* (Pristiphora) *achterbergi* sp. nov.
Claw Fig. 5: *Busarbia badagongensis* spec. nov., Fig. 6: *Pristiphora* (*Pristiphora*) *achterbergi* sp. nov.
Fig. 7: Serrulae 6-8 of *Pristiphora* (*Pristiphora*) *achterbergi* sp. nov., Fig. 8: Lancet and serrulae 1-3 of *Busarbia badagongensis* spec. nov.

Following the key of SMITH (2011), the new species runs to *Pristiphora inthanoni* Smith, 2011. *Pristiphora inthanoni* Smith, 2011 has tarsal claws with long inner tooth, slightly shorter than apical, clypeus and labrum are entirely brown, apical ring of hind tibia is black and intercostal crossvein interstitial with basal vein. In the new species, inner tooth of tarsal claw is small, apex of hind tibia is not black, labrum is white, clypeus with white anterior margin and intercostal corssvein is not interstitial with basal vein.

In the book of SAINI (2006b) and in the paper of SAINI and CHAMBAL (1996), the new species runs to *Pristiphora ecarinata* M.S. Saini & Chambal, 1996. The differences: middle serrulae (6th-8th) of *P. ecarinata* with 3-4 relatively larger teeth (see fig. 504 in SAINI 2006b). In the new species, these serrulae with 10 (exactly 10) minute but well visible teeth. Apex of serrulae in *P. ecarinata* rounded but it is very sharply cut in the new species. In *P. ecarinata,* cerci is significantly longer than sheath (in dorsal view), in the new species cerci is significantly shorter than sheet. In dorsal view, sheet of *P. ecarinata* is gently emarginated but in the new species, is very deeply excavated. Clypeus is truncate in *P. ecarinata*, however it is clearly emarginated in the new species. Sternites and sides of abdominal segments are auratus in *P. ecarinata*, but in the new species abdomen is clearly black and white without any auratus. Clypeus truncate in *P. ecarinata*, however clearly emarginated in the new species. Sternites and sides of abdominal segments auratus in *P. ecarinata*, but in the new species abdomen clearly black and white without any auratus. Tegula is not yellow in the new species. It is clearly white.

Busarbia badagongensis sp. nov.

(Fig. 1, 3, 5, 8, 9, 10)

Material: Holotype, female (Changsha University): S. China, Hunan, near Zhangjiajie, Badagong Mts., Bamaoxi, 02-03. 06. 2009, 540 m, Cees van Achterberg.

Female (Figs. 9 and 10). Head (Fig. 10) and antenna black; white: clypeus, labrum, mandibles (except narrow reddish brown apex), palpi, rectangular supraclypeal spot, 1-1 small spot above antennae, narrow apex of scape, brown: scape and pedicel. Thorax black, white: hind margin of pronotum, tegula, parapteron, wide transversal band of mesopleuron. Cenchri brownish white. All coxae, trochanters, femora and tibiae white. Tarsi yellowish brown in ventral view and white in dorsal view, last tarsal segment infuscate. Abdominal tergites brown. Sternites white, except brown last sternite. Ovipositor brown. Wings moderately and uniformly brown infuscate, costa, subcosta, stigma and venation brown. Ratio of antennal segments (1-9): 8 : 5 : 18 : 15 : 13 : 9 : 7 : 6 : 6. OOL : POL : OCL: 9 : 3 : 8. Width : length of postocellar area: 10 : 8. Postocellar furrow deep and divergent, not reaching hind margin of head. Postgenal carina reach up to 2/3 height of eye. Head smooth and shiny, except densely and deeply punctured supraantennal area and lower third of inner orbit. Head strongly contracted behind eyes. Frontal area clearly carinated, Busarbia type (as it figured in Malaise, 1944, page 16 fig. 8/c). Inner margins of eyes parallel. Antenna about as long as head and thorax combined including propodeum. Gena linear. Middle and lateral supraantennal pits large and deep, about 1.5 larger in diameter than front ocellus. Fore wing with 4 cubital cells. Basalis and first recurrent vein convergent. Origin of basalis removed from cubitus, this distance smaller than first cubital crossvein. Anal cell of fore wing without crossvein. Hind wing with 2 closed middle cells. Anal cell with petiole. Prescutum normal without distinct depressed area and middle carina. Mesonotal lobe finely, shallowly moderately densely and uniformly punctured with small punctures, shiny. Mesoscutellum, mesoscutellar append-

Fig. 9: *Busarbia badagongensis* sp. nov. holotype
photo: H. Gyurkovics

Fig. 10: Face of *Busarbia badagongensis* sp. nov. holotype
photo: H. Gyurkovics

Fig. 11: ***Pristiphora*** **(*Pristiphora*)** ***achterbergi*** **sp. nov. holotype**
photo: H. Gyurkovics

Fig. 12: ***Abeleses cyanosulawesiensis*** **sp. nov. holotype**
photo: H. Gyurkovics

Fig. 13: ***Abeleses cyanosulawesiensis*** **sp. nov. holotype, head and thorax in ventral view photo: H. Gyurkovics**

Fig. 14: ***Abeleses coeruleus*** **Rohwer, 1916, paraptype, head and thorax in lateral view, photo: D. Smith**

age, postscutellum, mesopleuron and metapleuron smooth and shiny. Mesosternum moderately densely punctured with shallow, small punctures, shiny. Prepectus present. First tergite smooth and shiny. Surface sculpture of other tergites extremely fine, hardly visible, nearly smooth and shiny. Ratio of hind tarsal segments: 35 : 14 : 11 : 4 : 8. Length of hind basitarsus : length of hind tibial spur: 35 : 13. Inner hind tibial spur simple. Ovipositor (Fig. 1 and 3) very short, shorter than hind basitarsus. Length of ovipositor : length of hind basitarsus: 26 : 35. Sawsheath in dorsal view with straight and dark hairs. Inner tooth of claws small (Fig. 5). Serrulae restricted to narrow apical part of sawsheath. Each serrulae with 2 larger thorns (Fig. 8). Length: 5.2 mm.

Etymology: the specific name refers to the place of collection.

In the key of MALAISE (1944), the new species runs to *Busarbia isshikii* (Takeuchi, 1928) but 3rd antennal segment is longer than 4th (*B. isshikii* 3rd and 4th segments are equal, the other Busarbia species has 3rd antennal segment shorter than 4th). In the key of SAINI (2006), this species would run to *Busarbia santokhi* Saini and Smith, 2005 (SAINI 2006). But in the new species, the malar space is nearly linear, in *B. santokhi*, it is 0.6x as long as diameter of median ocellus. In *B. santokhi* Saini and Smith metabasitarsus is longer than following tarsal joints combined, in the new species it is shorter as 23:26. Finally, in *B. santokhi* Saini and Smith, the supraclypeal and supraantennal area are black, these parts in the new species are extensively white. In the recently described Chinese species, it is similar to *Busarbia nigroscapa* Wei, 2002 (WEI and NIE 2002), but this species is more related to *B. isshikii* having 3rd antennal segment equal with 4th, body is densely pilose, scape is black and sheath is long and narrow. In the new species, body is sparsely pilose, scape is dominantly white, 3rd antennal segment is longer than 4th and sheat is very short, even shorter than hind basitarsus.

Siobla maxima R.E. Turner, 1920: Hunan, Shaoyang, near Suining Huangsang NR. 12-13. vi. 2009, 1 female, C. v. Achterberg. New record for Vietnam. (WEI et. al., 2006).

Abeleses cyanosulawesiensis sp. n.

(Fig. 12 and 13.)

Material: Holotype: male (Naturalis, Leiden), Indonesia: Sulawesi, near Mamasa Ponannang, 1620 m., Mal. trap., 09-22- iv. 1991, C. V. Achterberg.

Head and thorax black with strong dark bluish metallic reflection. Labrum, apex of mandible, palpi brown. Antenna black. Ventral side of apical four antennal segment and ventral apex of 5th antennal segment with white antennal organs. Legs black; whitish brown: middle tibia, middle tarsus, fore tibia and fore tarsus, white: narrow basal ring of all tibiae. Abdomen brown. Wings hyaline, fore wing from base of stigma brown infuscate. Costa, subcosta, stigma and veins dark brown. Anal cell of fore wing with strongly oblique crossvein. Basalis and first recurrent vein parallel. Number of cubital cells four. Basalis meet cubitus on subcosta at one point. Hind wing with complete marginal vein. Ratio of antennal segments: 11 : 9 : 39 : 32 : 24 : 17 : 13 : 12 : 13. Antenna about as long as head and thorax combined including propodeum. OOL : POL : OCL: 18 : 9 : 16. Frontal and supraantennal area deeply and densely punctured with large punctures, shiny. Vertex and temples moderately densely punctured with shallow, large punctures, shiny. Clypeus moderately densely, deeply punctured with moderately large punctures. Supraclypeal area smooth and shiny. Hind orbits moderately densely, deeply punctured with moderately large punctures, shiny. Inner margins of eyes convergent towards clypeus. Clypeus gently and roundly convex. Gena linear. Head behind eyes contracted.

Postocellar and postgenal carina missing. Mesonotal middle lobes nearly smooth and shiny, with minute, sporadic punctures. Mesoscutellum and mesoscutellar area smooth and shiny, with sporadic, minute punctures on hind margins. Metascutellum smooth and shiny. Upper half of mesopleuron densely punctured with small and deep punctures, lower half, mesosternum and katepimeron smooth and shiny. Abdomen and propodeum smooth and shiny. Head and mesonotum covered with moderately dense black hairs about as long as diameter of front ocellus. Mesopleuron covered with white hairs about same length. Hind coxa stgrongly lengthened. Hind tarsus and tibia densely covered with short black pubescence. Length of inner hind tibial spur : length of hind basitarsus: 17 : 39. Subapical tooth of claw shorter than apical. Length: 6.5 mm.

The new species is similar to *Abeleses coeruleus* Rohwer, 1916 (Fig. 14). However, *A. coeruleus* Rohwer is covered with white pubescence on top of thorax and head, the new species has black hairs there. Hairs are longer on the new species than in *A. coeruleus* Rohwer. Mesopleuron with large and deep punctures in the new species, these punctures are not visible in *A. coeruleus* Rohwer. Also the legs of the 2 species have different color.

Conclusions

Due to the intensive research of the latest 2 decades, the sawfly fauna of Hunan province is well known. Most of the collected species: 64%, were described locally. Other species were described from the neighboring territories, mainly from the former Indochina, Burma and Taiwan. Because of the high number of recently described species, further intensive research is required to clarify the hostplants, distribution and life history of the species. The sawfly fauna of the islands of Indonesia and Malaysia needs further intensive research with special focus on the high number of small islands which may even hold many endemic species. Per moment, the real species richness of these islands can not be estimated.

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Sawflies from Vietnam (Hymenoptera: Symphyta)

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Haris, A.: *Sawflies from Vietnam (Hymenoptera: Symphyta).*

Abstrtact: *Tenthredo* (*Tenthredella*) *devriesi* sp. nov., *Athlophorus abrahami* sp. nov. , *Busarbia hoaensis* sp. nov., *Heptamelus wuquangensis* sp. nov., *Mimathlophorus rubropedis* sp. nov., *Eusunoxa brunnea* sp. nov. and *Eurhadinoceraea quyi* sp. nov. are described from Vietnam. *Tenthredo* (*Tenthredella*) *compressicornuta* Taeger & Blank, 1996; *Neostromboceros planifrons* Wei, 1997; *Taxonus tianmunicus* Wei & Nie, 1998; *Athlophorus kurahashii* Togashi, 1979; *Athlophorus assamensis* Malaise, 1947; *Athlophorus maculiventris* (Cameron, 1899); *Parallantus maculipennis* Wei & Nie, 1998; *Empria litturata* (Gmelin, 1790); *Caliroa bilobatina* Wei, 2002; *Neostromboceros chalybeus* (Konow, 1908); *Ametastegia* (*Protemphytus*) *formosana* (Rohwer, 1916) and *Formosempria crassicornis* Wei & Nie, 2002 are first records for Vietnam.

Keywords: Hymenoptera; Symphyta; Tenthredinidae; Vietnam; New species

Introduction

The present paper is the fifth contribution of the author to the knowledge of the common sawflies (Tenthredinidae) of Vietnam (Haris 2006, 2007, 2008 and 2010). Perviously only few papers were published on the sawfly fauna of Vietnam. The first data were recorded from Indochina by Mocsáry (1900), Turner (1920) and Forsius (1931). In the late Nineties, Wei (1997a) described five new species from this country.

Material and Methods

This small collection was collected by Professor Cees van Achterberg and Mr. Rob de Vires both from Leiden Natural History Museum (Naturalis) in The Netherlands. It contains 70 specimens of 35 species including 7 species new to science. For identification, we used monographs of Malaise (1945, 1947) and Saini (2006, 2007) augmented with high number of subrecently published works of the research group of Dr. Meicai Wei (Wei 1997a, b, c, Nie and Wei 1998, Wei et al. 2003, Wei and Nie 1997, Liao et al. 2007; Wei and Zong 2002 etc.). The voucher specimens and holotypes are deposited in the collection of the Leiden Natural History Museum, Naturalis (official abbreviation RNMH). To identify the studied Symphyta, the identified and type material of the extensive Oriental Hymenoptera collections in Leiden NCB Naturalis and the Hungarian Natural History Museum were examined.

For identification of the new species, the morphological studies were completed with genitalia drawings and descriptions. Sawsheaths, lancets and penis valves were studied

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and figured. Lancets and penis valves were mounted on slides and studied under high magnification (1000x and 1500x) of microscope, sawsheaths were studied under stereo microscope with 100x magnification.

Descriptions

Tenthredo* (*Tenthredella*) *devriesi sp. nov.

(Fig. 1, 4, 7, 15, 23, 24)

Material: Holotype, female(RMNH): N. Vietnam, Hoa Bink, Pa Co Hang Kia N. R., 1377 m., N20°44'44", E10°53'34", 10-24. x. 2009, Mal. tr. 21. RMNH. Cees van Achterberg and Rob de Vries.

Female (Figs. 23 and 24). Head including mouthparts white; black: vertex, hind margin of temples, upper third of postoccipital area above, frontal spot not reaching eyes and antennae, middle spot of clypeus, lower clypeal margin, upper narrow margin of eyes and apical half of mandible. Antenna black; white: small apical spot on scape, apical half of antennal segment 4, whole antennal segment 5 and half of segment 6 in dorsal view. Thorax black; white: long oval spot on propleuron, hind corners of pronotum, tegula, arrow shaped hind margin of mesonotal middle lobe, larger rectangular spot on upper third of mesopleuron, narrow horizontal line in middle of mesopleuron, most of mesoscutellum, mesoscutellar appendage, rectangular spot behind metascutellum, large rectangular central spot on metapleuron and narrow line in middle of mesosternum. Cenchri pale brownish white. Coxae black. Middle and hind coxae with white strip, fore coxa with white apex. Trochanters white. Middle and hind femora, tibiae and tarsi reddish yellow. Fore femur white, dorso-apical 2/3 black. Dorsal side of fore tibia black, ventral side white. Fore tarsal segments white with dorsal black line on segments 1-4. Apical half of fore and hind wings moderately brown infuscate. Stigma, subcosta and venation black, costa yellow. Abdomen black with violet luster; white: large rectangular spot on side of propodeum; reddish yellow: large spot covering middle part of tergite and sternites of abdominal segments 2 and 3. Head strongly shiny, shallowly and sparsely punctured. Occipital carina reaches up to middle of the temple. Head contracted behind eyes. Frontal area deeply sunken, moderately densely and moderately deeply punctured, shiny. Supraantennal tubercles separated, extremely narrow, not reaching upto base of scape, white with light brown apical margin. Postocellar furrows slightly divergent reaching hypothetic hind margin of head. Clypeus widely and moderately deeply emarginated up to 1/3 of its median length. Gena linear. Labrum large, slightly and bluntly projected apically. OOL : POL : OCL: 22 : 4 : 17. Length : width of postocellar area: 19 : 17. Ratios of antennal segments (1-9): 21 : 10 : 55 : 70 : 52 : 49 : 39 : 37 : 37. Antenna long, about as long as head, thorax and first 2 abdominal segments combined. Pronotum and mesonotum moderately densely and moderately deeply punctured, shiny. Interspaces between punctures about 0.75x diameter of a puncture. Mesopleuron moderately densely and moderately deeply punctured, shiny, spaces between punctures about 0.5-1x diameter of a puncture. Mesoscutellum densely punctured with moderately deep, shallow and larger punctures. Spaces between puncture about 0.4x diameter of a puncture. Mesoscutellar appendage smooth and shiny. Metascutellum with fine, superficial and transversal surface sculpture with sporadic large and deep punctures, shiny. Abdominal tergites shiny with fine superficial surface sculpture. First abdominal tergite (propodeum) smooth and shiny. Mesoscutellum blunt and subpyramidal without carina. Mesosternum smooth without thorn, side of mesopleuron bluntly rounded. Ovipositor

(Figs. 1 and 4) longer than hind basitarsus as 18 : 15. In dorsal view, ovipositor narrowed and covered with straight, black hairs. Sawsheath with 29 serrulae, middle serrulae with 20-22 minute teeth. Serrulae 7-9 in Fig.15. Subapical tooth of claw wider and longer than apical (Fig. 7). Length: 16.5 mm.

Etymology: the new species is gratefully dedicated to Mr. Rob de Vries, Dutch entomologist, member of the expedition.

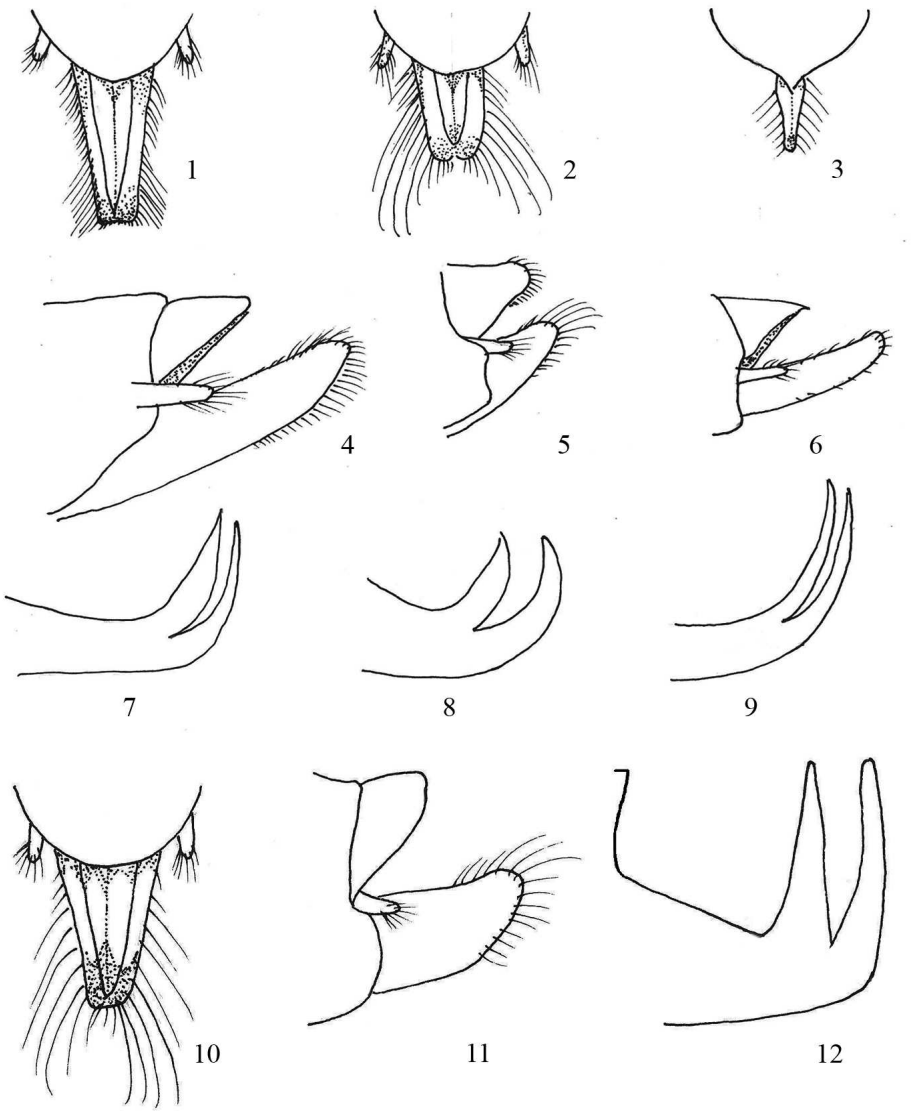
In Malaise's and Sainis's keys (MALAISE 1945, SAINI 2007), the new species runs to *Tenthredo cretata* Konow, 1898. In *T. cretata* Konow, not only 2nd and 3rd abdominal tergites are reddish-yellow, but even the 4th and 6th are as well. In *T. cretata*, the head in dorsal view, is dominantly black (in this view, the white area is restricted to temples), mesonotal middle lobe without arrow like apex only with white lateral margins, hind orbit in the upper quarter is black, apical tooth of claw is much longer than subapical. In the new species, reddish yellow color of abdomen is restricted to tergite and sternite 2 and 3. Head in dorsal view dominantly white: not only temples but vertex and wide inner orbits as well. Mesonotal middle lobe with arrow-like apical spot and outer orbits are entirely white. Subapical tooth of claw is longer than apical. For other morphological differences see SAINI 2007. Amongst the recently described Chinese species, there are several similar species in having white ringed antenna like *Tenthredo niui* Wei, 1998, *T. oligoleucomacula* Wei, 1998, *T. puncticincta* Wei , 1998, *T. rufotibianella* Wei, 1998, (NIE and WEI 1998) *T. micrommota* Wei, 2002 (WEI and ZHONG 2002) and *T. taumatogaster* Wei and Nie, 2003 (WEI et al. 2003) but none of them is closer to the new species than *Tenthredo cretata* Konow.

Athlophorus abrahami sp. nov.

(Fig. 2, 5, 8, 14, 25, 26)

Material: Holotype, female (RMNH):, N. Vietnam, Hoa Binh, Pa Co Hang Kia Nr., 1330 m, N20°44'37", E 04°53'45", 10-24. x. 2009, Mal. trap. 11, RMNH. Cees van Achterberg and Rob de Vries.

Female (Figs. 25 and 26). Head reddish brown; white: clypeus, labrum, wide inner orbit up to 2/3 of eye, whole outer orbit; black: narrow margins of lateral teeth of clypeus, narrow hind corner of gena. Antenna reddish brown, scape whitish brown, apical half of antennal segment 4 and total antennal segment 5 black. Mesonotal lobes reddish brown with longitudinal blackish shadow on lateral lobes. Hind margin of lateral mesonotal lobe whitish brown. Mesoscutellum black with 2 larger lateral white spots, these white spots with reddish brown inner margins. Mesoscutellar appendage light reddish brown. Metascutellum black with lateral whitish brown spots. White: cenchri, triangular area behind cenchri. Sunken lateral parts of postnotum reddish brown with lateral black margin. Mesopleuron black with wide white hind margin and with large white spot in middle of its upper third. Mesopleuron separated from mesosternum with wide reddish brown band. Inner margin of katepimeron black with reddish brown coloration in middle and white outside. Lower 2/3 of metapleuron white, upper 1/3 light reddish brown with black margin on top. Mesosternum black, metasternum white. Coxae white, anterior coxa with black ventral band, hind coxa with ventral and lateral black bands, middle coxa entirely white with narrow black apex. Trochanters white with ventral black spots. All femora and tibiae white with black longitudinal lines. Tarsi white with black ventral line, apical joint of fore and middle tarsi and apical 2 joints of hind tarsus black. Wings hyaline, radial cells entirely and adjoining parts of cubital cells brown infuscate. Venation black, costa and stigma yellow. Upper third of first tergite black with 2 basal triangular reddish brown spots. Abdominal tergites brown, except black tergite 8. Apical 2/3 of first tergite, wide lateral triangular margins of tergites 2-4,



Figs. 1-12: Sawsheath in dorsal view: Fig. 1: *Tenthredo* (*Tenthredella*) *devriesi* sp. nov.; Fig. 2: *Athlophorus abrahami* sp. nov.; Fig. 3: *Heptamelus wuquangensis* sp. nov.; Fig. 10: *Mimathlophorus rubropedis* spec. nov.; Sawsheath in lateral view: Fig. 4: *Tenthredo* (*Tenthredella*) *devriesi* sp. nov.; Fig. 5: *Athlophorus abrahami* sp. nov.; Fig. 6: *Heptamelus wuquangensis* sp. nov.; Fig. 11: *Mimathlophorus rubropedis* spec. nov.; Claw: Fig. 7: *Tenthredo* (*Tenthredella*) *devriesi* sp. nov.; Fig. 8: *Athlophorus abrahami* sp. nov.; Fig. 9: *Heptamelus wuquangensis* sp. nov.; Fig. 12: *Mimathlophorus rubropedis* sp. nov.

hind margins of tergites 5-8, apical spot of tergite 9 and tergite 10 entirely white. Sternite 1st black with white margin, sternites 2-4 entirely white other sternites black with white hind margin. Ovipositor black with reddish brown lower margin. Head with minute, shallow, moderately dense punctures, shiny. Distance between cubital vein and basal vein on the subcosta about as long as first cubital crossvein: 1.0 : 1.0. Fore wing with 3 cubital cells. Crossvein of anal cell strongly oblique, about 45°. Anal cell of hind wing with long petiole. Cubital and middle cell of hind wing opened. Clypeus deeply emarginated, nearly half as deep as clypeal median length. OOL : POL : OCL: 17 : 10 : 23. Ratios of antennal segments 1-9: 15 : 6 : 31 : 34 : 30 : 19 : 15 : 15 : 16. Apical 5 antennal segments gently compressed. Width : length of postocellar area: 24 : 23. Postoccipital carina narrow reaching nearly up to the top of eyes. Frontal area raised up above level of head without sharp carina. Supraantennal tubercles narrow and small. Antenna about as long as head and thorax combined till the end of metanotum. Mesonotum and pronotum very finely, moderately densely punctured with small and shallow punctures, shiny. Mesoscutellum densely punctured with deep and small punctures, slightly shiny. Mesoscutellar appendage sporadically punctured with small, shallow punctures. Metanotum smooth and shiny. Upper half of mesopleuron (except smooth and shiny white central spot) with large, deep punctures, shiny. Ventral half of mesopleuron with small, moderately dense and shallow punctures, shiny. Katepimeron smooth and shiny. Metapleuron with shallow, dense, small punctures in middle otherwise smooth and shiny. Mesopleuron bluntly rounded and slightly elevated with short longitudinal carina starting from hind margin and reaching central part of mesopleuron. Abdominal tergites with fine, superficial, coriaceous surface sculpture. Propodeum smooth and shiny. Length of hind basitarsus : length of inner hind tibial spur: 40 : 14. Ovipositor (Figs. 2 and 5) in dorsal view gently narrowed, covered with pale, soft hairs. Length of ovipositor : length of hind basitarsus: 53 : 42. Apical and subapical teeth of claws subequal (Fig. 8). Sawsheath with 23 serrulae. Serrulae 8-10 in Fig.14. Length: 8.0 mm.

Etymology: The new species is dedicated to Dr. Levente Ábrahám, Hungarian entomologist.

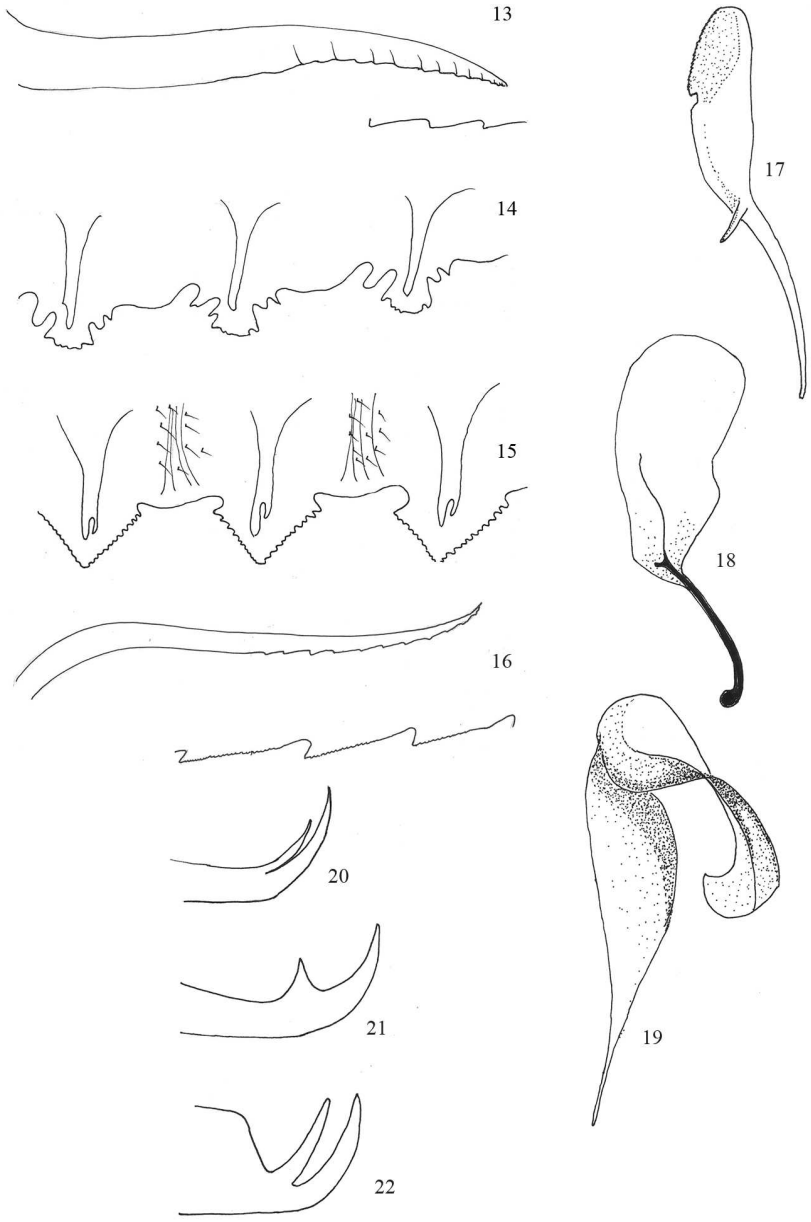
Regarding the closely related *Athlophorus* species, in the key of MALAISE (1947), the new species runs to *Athlophorus stigma* Malaise, 1947. In *A. stigma* Malaise, apical antennal segments are white, not reddish, stigma is bicolor, mesoscutellum with acute thorn and head with black spots. In the new species, apical antennal segments are reddish, stigma is yellow, mesoscutellum is nearly flat and head is without any black spots. Several new species were published by Wei and Saini, however, the unique oculus-pattern of mesopleuron (see Fig. 25) distinguish the new species from the allied ones.

Busarbia hoaensis sp. nov.

(Fig. 18, 21, 27, 28)

Material: Holotype, male (RMNH):, N. Vietnam, Hoa Bink, Pa Co Hang Kia N. R., 1379 m., N20°44'42", E 10°53'34", 10-24. x. 2009, Mal. tr. 17. RMNH. Cees van Achterberg and Rob de Vries.

Male (Figs. 27 and 28). Head black, clypeus, labrum, mandibles and palpi white. Apex of mandible brown. Antenna black, scape and pedicell white, third antennal segment whitish brown in dorsal view. Thorax black; white: pronotal corner, tegula, parapteron, cenchri , metapleuron, metasternum and one moderately large spot on middle-hind margin of mesopleuron. Legs (including coxae and trochanters) white except dark greyish-brown apical tarsal segments. First abdominal tergite (propodeum) black with large white triangular membraneous area. Other tergites dark brown. Sternites whitish brown except apical 2 dark brown sternites. Wings slightly and evenly infuscate. Costa, stigma



Figs 13-22: Fig. 13: Lancet and serrulae 3-5 of *Mimathlophorus rubropedis* sp. nov.; Fig. 14: Serrulae 8-10 of *Athlophorus abrahami* sp. nov.; Fig. 15: Serrulae 7-9 of *Tenthredo* (*Tenthredella*) *devriesi* sp. nov.; Fig. 16: Lancet and serrulae 3-5 of *Heptamelus wuquangensis* sp. nov.
Penis valve: Fig. 17: *Eusunoxa brunnea* spec. nov.; Fig. 18: *Busarbia hoaensis* sp. nov.; Fig. 19: *Eurhadinoceraea quyi* sp. nov.
Claw: Fig. 20: *Eusunoxa brunnea* spec. nov.; Fig. 21: *Busarbia hoaensis* sp. nov.; Fig. 22: *Eurhadinoceraea quyi* sp. nov.

Fig. 23: ***Tenthredo*** **(*Tenthredella*)** ***devriesi*** **sp. nov. holotype head and thorax**

Fig. 24: ***Tenthredo*** **(*Tenthredella*)** ***devriesi*** **sp. nov. holotype**

Fig. 25: ***Athlophorus abrahami*** **sp. nov. head and thorax, holotype**

Fig. 26: ***Athlophorus abrahami*** **sp. nov. holotype**

and venation brownish black. head strongly contracted behind eyes. Postgenal carina very fine, hardly visible reaching up to the 1/3 of eye. Frontal area sunken, subtriangular above and sharply limited by carina similar to the illustration in Malaise, 1944 Fig. 8/c on page 16. Inner margin of eyes gently convergent, subparallel. OOL : POL : OCL: 12 : 5 : 18. Width: length of postocellar area: 19: 18. Ratios of antennal segments (1-9): 9 : 6 : 24 : 27 : 19 : 11 : 10 : 10 : 10. Scape and pedicell longer than wide. Antenna slightly longer than head and thorax (including propodeum) combined. Gena about as wide as 1/3 length of front ocellus. Clypeus widely and roundly emarginated. Clypeal emargination about 0.36x as deep as clypeal median length. Number of cubital cells: 4. Basalis evenly curved, meet with first recurrent vein in one point. Radial crossvein meets radial vein in front of last cubital crossvein. Anal cell of fore wing without crossvein. Distance between basal vein and cubital vein on subcosta subequal with length of first cubital crossvein. Anal cell of hind wing with short petiole. Head and thorax smooth and shiny. Frontal basin with few, large wrinkles, moderately shiny. Propodeum smooth and shiny with fine coriaceous surface sculpture in middle. Abdominal tergites with fine, coriaceous surface sculpture, moderately shiny. Prescutum normal without distinct depressed area and middle carina. Mesoscutellum flat withouth carina. Mesoscutellar appendage 1/3x as long as mesoscutellum. Ratios of hind tarsal segments: 30 : 10 : 7 : 4 : 5. Hind tarsus sligthly longer than other tarsal segments. Inner hind tibial spur simple. Length of inner hind tibial spur: length of hind basitarsus: 1.0 : 3.0. Claws without basal lobe, with small inner tooth (Fig. 21). Penis valve in Fig. 18. Length: 4.3 mm. Female unknown.

Etymology: the specific name refers to the place of collection.

The new species closely related to *Busarbia santokhi* M.S. Saini & D.R. Smith, 2005. The new species strikingly different from *Busarbia santokhi* by the shape of penis valve (see Fig. 18), also the genal width is significantly shorter.

Heptamelus wuquangensis sp. nov.

(Fig. 3, 6, 9, 16, 29)

Material: Holotype, female (RMNH): C. Vietnam, Ha Tinh, Wu Quang NP., 88 m. N18°19'46", E105°26'38", 23. ix.- 05. x. 2009. Mal. tr. 26. Cees van Achterberg and Rob de Vries.

Female (Fig. 29): Head black; labrum and apical half of mandibles brown. Thorax black; white: tegula and cenchri; yellow: 2 triangular spots between mesoscutellum and mesoscutellar appendage and metascutellum. Brown: mesoscutellar appendage; brownish white: narrow hind margins of pronotum. Antenna black, scape and pedicell white, pedicell dorsally with brown suffusion. Palpi brownish white. Fore and middle coxae, fore and middle trochanters, all tarsi white, other parts of legs yellow, hind tibia with brown apical spot outside. Wings slightly infumate-subhyaline, venation, costa and stigma dark brown. Stigma wide and rounded, length: width: 2 : 1. Number of radial cells: 3. First radial crossvein fragmented. Basalis strongly curved. Distance between basalis and radial vein on subcosta equal with length of second radial crossvein. Hind wing with 2 closed middle cells. Anal cell of hind wing with long petiole. Abdomen yellow; brown: margin around triangular membranous blotch of propodeum, tergites 2-6 with gradually increasing central black spots. Four last apical tergites entirely black, apical half of ovipositor black. Hind margins of temples and vertex moderately densely punctured, other parts of head with small and moderately deep punctures. Temples and vertex sparsely punctured with small punctures, shiny. Clypeus moderately densely punctured with small punctures, shiny. Length and width of clypeus: 11: 31. Temples narrow, strongly contracted behind eyes. OOL : POL : OCL: 4 : 2 : 5. Width : length of postocellar area: 7 : 5. Ratios of antennal segments (1-7): 7 : 6 : 14 : 14 : 13 : 12 : 14.

Clypeus widely and triangularly emarginated, 0.33x clypeal median length. Gena linear, head without postgenal and postoccipital carina. Postocellar furrows straight and parallel. Frontal area not marked. Supraantennal longitudinal furrow present. Antenna as long as head and thorax combined without propodeum. Inner margins of eyes convergent. Mesonotal lobes moderately densely, minutely and shallowly punctured, shiny. Mesoscutellum sporadically punctured with moderately large and moderately deep punctures, shiny. Mesoscutellar appendage and metanotum smooth and shiny. Mesopleuron sparsely punctured with large, deep punctures, shiny. Abdominal tergites 1-3 smooth and shiny, other tergites with fine, superficial coriaceous sculpture, shiny. Subapical tooth of claw (Fig. 9) wider and longer than apical. Basal lobe missing. Ovipositor (Figs. 3 and 6) strongly narrowed in dorsal view with straight black hairs. Ovipositor long, length of ovipositor : length of hind basitarsus: 83 : 49. Ratios of hind tarsal segments: 39 : 15 : 8 : 3 : 11. Lancet with 11 serrulae. Serrulae 3-5 in Fig. 16. Length of inner hind tibial spur: length of basitarsus: 13 : 39. Length: 6.5 mm. Male unknown.

Etymology: the specific name refers to the place of collection.

The most closely allied species is *Heptamelus kalamunitopensis* Saini and Saini, 1997 (SAINI 2006). However, clypeus in *H. kalamunitopensis* is very deeply and roundly emarginated. Emargination of the the clypeus in the new species is only moderately deep and triangular. Among Chinese species, *Heptamelus yunnanensis* Wei, 1997 (WEI and NIE 1997) is the most similar to the new species. In *H. yunnanensis* middle fovea is round, deep and much larger than an ocellus, tegula and scape are brown, pedicell is black and the whole thorax including metanotum and propodeum is black. In the new species, middle fovea is narrow, furrow like, deep and much smaller than an ocellus. Hind margin of pronotum, tegula, scape and pedicell are white and mesoscutellum with 2 large ocker-yellow lateral spots on hind margin, propodeum is yellow with brown margin and metanotum is yellow.

Mimathlophorus rubropedis sp. nov.

(Fig. 10, 11, 12, 13, 30)

Material: Holotype, female (RMNH): N. Vietnam, Hoa Binh, Pa Co Hang Kla , 1327 m, N20°44' 6", E104°53'46", 10-24. x. 2009, Taiw. tr. Cees van Achterberg and Rob de Vries.

Female (Fig. 30). Head black; labrum, basal half of mandible white, apical half reddish brown. Antenna black, apical 2/3 of 5th segment, and whole of 6th and 7th segments white. (Last 2 antennal segments missing). Palpi white. Thorax black, tegulae, cenchri, large central spot on mesoscutellum and metascutellum white. Fore and middle legs yellowish white, apical 3 tarsal joints dark brown. Hind coxa black with white longitudinal band, hind trochanter white, hind femur black with white basal spot, hind tibia yellow with black apical ring, hind tarsus entirely white. First abdominal tergite black. Tergites 2-7 dark brown with wide white basal margins. Tergite 8-9 dominantly white with dark brown basal band. Abdominal sternites white, except dark brown apical three sternites. Ovipositor brownish black. Wings hyaline, subcosta, most of stigma and venation dark brown. Costa and basal quarter of stigma white. Number of cubital cells 3, anal cell of fore wing with transverse, about 60° crossvein. Basalis and first recurrent vein subparallel. Basalis meets cubitus in one point on subcosta. Hind wing without closed middle cell. Anal cell with short petiole, nervellus join to apex of anal cell. Head uniformly covered with dense, shallow and minute punctures, moderately shiny. Temples wide, contracted behind eyes. Postgenal carina week reaching not longer than ¼ of eye length. OOL : POL : OCL: 6 : 3 : 10. Width : length of postocellar area: 4 : 5. Margines of

Fig. 27: ***Busarbia hoaensis*** **sp. nov. head and Fig. 28:** ***Busarbia hoaensis*** **sp. nov. holotype**

Fig. 29: ***Heptamelus wuquangensis*** **sp. nov. holotype**

Fig. 30: ***Mimathlophorus rubropedis*** **sp. nov. holotype**

Fig. 31: ***Eusunoxa brunnea*** **sp. nov. holotype**

frontal area deeply sunken. Ratios of antennal segments: 15 : 6 : 32 : 45 : 35 : 20 : 18 : last 2 antennal segments missing. Antenna very long, significantly longer than head and thorax, including propodeum combined. Gena linear, clypeus broadly, roundly emarginated up to half of its median length of clypeus. Pronotum, mesonotum, hind margin of mesoscutellum and mesoscutellar appendage with small, shallow and dense punctures, moderately shiny. Mesoscutellum and meatescutellum with moderately large, moderately deep and moderately dense punctures, shiny. Mesopleuron with moderately deep, dense, small punctures, sligthly shiny. Prepectus missing, mesoscutellum flat. First abdominal tergite smooth and shiny, others with fine coriaceous surface sculpture, shiny. Ovipositor (Figs 10 and 11) gradually narrowed and with dark, gently curved hairs in dorsal view. Length of ovipositor : length of hind basitarsus: 21 : 25. Ratios of hind tarsal segments: 60 : 28 : 15 : 5 : 11. Length of inner hind tibial spur: length of basitarsus: 29 : 60. Claws without basal lobe, subapical tooth about as long as apical but slightly wider (Fig. 12). Serrulae restricted to apical third of lancet (Fig. 13). Number of serrulae. 9. Serrulae simple without any micro-tooth even in high magnification. Sawsheath and 3th-5th serrulae in Fig. 16. Length: 11.1 mm.

Etymology: rubro: red, pedis: leg.

The closest relative of the new species is *Mimathlophorus fulvitarsis* Wei, 1997 (Wei, 1997c). These species differ in ovipositors. *Mimathlophorus fulvitarsis* Wei, 1997 has 23 serrulae distributed throughout of the lancet and the serrulae have minute teeth. In the new species, lancet has 9 serrulae and they are localized in the apical third of lancet. *Mimathlophorus fulvitarsis* Wei, 1997 has apical half of hind femur, metascutellum and labrum black while the new species has the whole hind femur black; metascutellum and labrum are white.

Eusunoxa brunnea sp. nov.

(Fig. 17, 20, 31)

Material: Holotype, male (RMNH): C. Vietnam, Ha Tinh, Vu Quang N. P., 120 m, N18°19'37", E105°26'29. 23" ix. 05 x. 2009, Mal. tr., Cees van Achterberg, Rob de Vries.

Male (Fig. 31). Head and antenna black; whitish brown: labrum, mandibles and palpi. Thorax entirely black, only cenchri white. Coxae brown with white apex, trochanters white, fore and middle femora and fore tibia brown above and white below. Middle tibia brown above and whitish brown below. Fore and middle tarsi brown, basal 2 tarsal segments of fore tarsus white below, middle basitarsus whitish brown below. Hind femur, tibia and tarsus black, base of hind femur white. Wings slightly infuscate, costa, subcosta, stigma and venation dark brownish black. Abdomen brown. Head smooth and shiny. Frontal area from eye to eye roughly and deeply punctured with large punctures, in major part without shiny interspaces, in smaller part with shiny interspaces, this shiny interspaces are very narrow, do not exceed 0.3x of diameter of a puncture. OOL : POL : OCL: 6 : 7 : 6. Postocellar furrow slightly divergent-subparallel, reaching hind margin of head. Width : length of postocellar area: 14: 6. Ratios of antennal segments (1-9): 7 : 5 : 15 : 15 : 12 : 10 : 7 : 6 : 7. Clypeus densely, moderately deeply punctured with small punctures. Head strongly contracted behind eyes, temples narrow. Frontal area small, rounded and deeply sunken without carina. Middle supraantennal pit about as large as front ocellus, lateral supraantennal pit somewhat smaller. Gena narrow, about 1/3x diameter of front ocellus. Postgenal carina present but hardly visible reaching up to 1/3 length of eye. Postorbital area narrow. Thorax entirely smooth and shiny. Propodeum smooth and shiny, other tergites with fine coriaceous surface sculpture, shiny. Number of cubital cells: 4, basalis and first recurrent vein parallel, basalis and cubital vein meet at one point

on subcosta. Crossvein of anal cell placed in middle. Hind wing without marginal vein, with one closed middle cell. Anal cell with petiole. Hind femur reach over the end of abdomen. Hind basitarsus widened, length: maximal width: 41 : 11. Inner front tibial spur simple. Subapical tooth of claws narrower and smaller than apical without basal lobe (Fig. 20). Penis valve in Fig. 17. Length: 5.6 mm.

Etymology: brunnea: brown, refers to the color of abdomen.

The new species is related to *Eusunoxa semipunctata* Smith and Saini, 2003. The new species can be distinguished from *E. semipunctata* by several characters. Fore and middle femora in ventral view are white in the new species and black in *E. semipunctata*. Penis valves are also strikingly different (compare Fig. 17 and Fig. 638 in SAINI 2006). The hind margin of penis valve is straight in the new species but distinctly concave in *E. semipunctata*. In *E. semipunctata*, the middle incision of penis valve is deep and large while it is small and shallow in the new species.

Eurhadinoceraea quyi sp. nov.

(Fig. 19, 22)

Material: Holotype (RMNH): male, S. Vietnam, Dong Nai, Cat Tien N. P., 100 m., 19-25. iv. 2007. Mal. traps., Mai Phu Quy and Nguyen Thanh Manh.

Male. Head, thorax, antenna black; grayish white: palpi; white: round spot on hind corner of pronotum, cenchri, narrow apices of coxae, apex of second joint of fore trochanter, second joint of middle trochanter, ventral half of first joint, total second joint of hind trochanter, base of fore and middle tibia; brownish white: outer surface of fore and middle tibia. Abdomen dark blackish brown. Labrum brown, basal half of mandible reddish brown. Apical third of fore wing slightly brown infuscate from base of stigma, wings otherwise hyaline. Clypeus truncate. Posgenal and postoccipital carina missing. Head contracted behind eyes. Posoccipital furrow deep and divergent, not reaching hypothetic hind margin of head. Gena linear. Eyes large. Hind orbits narrow. OOL : POL : OCL: 7 : 6 : 10. Ratios of antennal segments: 9 : 7 : 29 : 21 : 19 : 11 : 9 : 8 : 7. Pedicell nearly as wide as long: 9 : 8. Antenna as long as head and thorax combined without propodeum. 4-9 antennal segments gently flattened. Length : width of postocellar area: 10 : 13. Head, clypeus smooth and shiny, inner orbits with sporadic, shallow punctures. Pentagonal frontal area deeply sunken. Middle and lateral supraantennal furrows deep and about as large as front ocellus. Thorax and abdominal tergites entirely smooth and shiny. Prepectus absent. Mesoscutellar appendage small and narrow. Metascutellum well developed. Mesoscutellum flat. Fore wing with 3 cubital cells. Basalis and first recurrent vein parallel. Basalis meets cubitus in one point on subcosta. Radial crossvein meets radial vein in half way between 2nd and 3rd cubital crossvein. Anal cell straight. Hind wing without closed middle cell and marginal vein. Anal cell with petiole. Ratios of hind tarsal segments: 20 : 6 : 6 : 3 : 6. Claws with basal lobe, apical and subapical tooth subequal (Fig. 22). Penis valve in Fig. 19. Length: 5.4 mm.

Etymology: the new species is dedicated to Mr. Mai Phu Quy zoologist from Vietnam.

The new species is closely related to *Eurhadinoceraea amauros* (ZOMBORI 1977) and in the key of Wei (1999), the new species also runs to this species. The differences: Hind wing without closed discoidal cell. The white color of tibiae and trochanter and the rounded spot on pronotum are also differs the new species from *E. amauros*.

The new species also slightly resembles to *Kompongia cambodgensis* Malaise, 1937 (MALAISE 1937), *K. cambodgensis* has broad and deep interocellar furrow, postocellar furrows are missing, abdomen with bluish or purple luster, wings are strongly infuscate,

tibiae and pronotum are white and hind wing with small appendiculate cell. The new species has no interocellar furrow, but broad and deep postocellar furrows, wings are hyaline, only apical third is slightly infuscate, abdomen without bluish or purplish luster, tibiae and pronotum are brownish black (except small dot on pronotum) and hind wing is without appendiculate cell.

Conclusions

Actual number of recorded common sawflies (Tenthredinidae) in Vietnam is 140. It is still low number and only fragment of the real species richness which is estimated to about 500 species in this country. High number of species (51) was firstly described from Vietnam. Numerous species previously known and described from China were recorded in Vietnam as well. In this early phase of research we could not discuss sawfly fauna of Vietnam but this paper together with others are significant contribution to understand the biodiversity of the country.

Sawflies (Tenthredinidae) from Vietnam

Tenthredo (*Tenthredella*) *compressicornuta* Taeger & Blank, 1996
(Originally: *Tenthredo* (*Tenthredella*) *compressicornis* Cameron, 1899): Hoa Binh, Pa Co Hang Kia Nr., 1330 m, N20°44'37", E104°53'45", 10-24. x. 2009, Mal. trap., 1 female, Achterberg and de Vries.
First record for Vietnam.

Neostromboceros planifrons Wei, 1997
Ninh Binh, Cuc Phuong Np., light trap., 09. x. 2009. leg.: E. Gasso Miracle, 1 female.
First record for Vietnam.

Taxonus formosacola (Rohwer, 1916)
Hoa Binh, Pa Co Hang Kia Nr., 1330 m, N20°44'37", E104°53'45", 10-24. x. 2009, Mal. trap., 1 male.

Taxonus tianmunicus Wei & Nie, 1998
Hoa Binh, Pa Co Hang Kia Nr., 1324 m, N20°44'36", E104°53'44", 10-24. x. 2009, 1 female, Achterberg and de Vries.
First record for Vietnam.

Nesoselandria albotegularissima Haris, 2006
Hoa Binh, Pa Co Hang Kia Nr., 1030 m, N20°44'36", E104°53'46", 10-24. x. 2009, Taiw. trap., Achterberg and de Vries, 1 female; Hoa Binh, Pa Co Hang Kia Nr., 1327 m, N20°44'36", E104°53'46", 10-24. x. 2009, Mal. trap., Achterberg and de Vries, 1 female; Hoa Binh, Pa Co Hang Kia Nr., 1321 m, N20°44'36", E 104°53'44", 10-24. x. 2009, Mal. trap., Achterberg and de Vries, 1 female; Hoa Binh, Pa Co Hang Kia Nr., 1051 m, N20°44'28", E104°53'45", 11-23. x. 2009, Mal. trap., Achterberg and de Vries, 1 male, 1 female; C. Vietnam, Ha Tinh, Vu Quang N. P., 166 m, N18°17'39", E105°25'27", Achterberg and de Vries, 1 female.

Nesoselandria shanica Malaise, 1944
C. Vietnam, Ha Tinh, Vu Quang N. P., 142 m, N18°17'39", E105°25'32", 24. ix. – 05. x. 2009, 1 female, Achterberg and de Vries.

Nesoselandria devriesiana Haris, 2006
C. Vietnam, Ha Tinh, Vu Quang N. P., 139 m, N18°17'41", E105°25'34", 24. ix. – 05. x. 2009, 1 female, Achterberg and de Vries.

Ametastegia (*Protemphytus*) *formosana* (Rohwer, 1916)
North Vietnam, Hai Phong Cat Ba Np., 19. x. 2009, 1 female. First record for Vietnam.

Athlophorus kurahashii Togashi, 1979
S. Vietnam, Dong Nai, Cat Tien N. P., 100 m., 14-20. v. 2007., 1 male, Mal. traps., Achterberg and de Vries. First record for Vietnam.

Athlophorus assamensis Malaise, 1947

Hoa Binh, Pa Co Hang Kia Nr., 1030 m, N20°44'35", E104°53'22", 9-23. x. 2009, Mal. trap., 1 female, Achterberg and de Vries.

First record for Vietnam.

Athlophorus perplexus ssp. *perplexus* (Konow, 1898)

N. Vietnam, Ninh Binh, Cuc Phuong NP., near centre, c. 225 m, 15 iii – 14. iv. 2000, 1 female, 1 male, May Phu Quy.

Athlophorus maculiventris (Cameron, 1899)

Hoa Binh, Pa Co Hang Kia Nr., 1030 m, N20°44'37", E104°53'45", 10-24. x. 2009, Mal. trap., 1 male, Achterberg and de Vries.

First record for Vietnam.

Parallantus maculipennis Wei & Nie, 1998

Hoa Binh, Pa Co Hang Kia Nr., 1030 m, N20°44'35", E104°53'22", 9-23. x. 2009, Mal. trap., 1 female, Achterberg and de Vries,; Hoa Binh, Pa Co Hang Kia Nr., 1046 m, N20°44'37", E104°53'20", 9-23. x. 2009, Mal. trap., 2 females, Achterberg and de Vries; Hoa Binh, Pa Co Hang Kia Nr., 1381 m, N20°44'43", E104°53'35", 10-24. x. 2009, Mal. trap., 1 male, Achterberg and de Vries; Hoa Binh, Pa Co Hang Kia Nr., 1045 m, N20°44'37", E104°53'20", 9-23. x. 2009, Mal. trap., 1 male, Achterberg and de Vries.

First record for Vietnam.

Empria litturata (Gmelin, 1790)

C. Vietnam, Ha Tinh, Vu Quang N. P., 53 m, N 18° 21' 02", E 104° 55' 43", 22 ix. – 06. x. 2007, 1 female, Achterberg and de Vries.

Insect pest, probably introduced. In this region, there are extensive strawberry fields are placed. First record for Vietnam.

Oralia fulva Wei & Nie, 1998

Hoa Binh, Pa Co Hang Kia Nr., 1327 m, N20°44'36", E104°53'46", 10-24. x. 2009, 1 female, Achterberg and de Vries.

Metallus compressicornis Malaise, 1964

Hoa Binh, Pa Co Hang Kia Nr., 1072 m, N20°44'27", E104°55'43", 11-23. x. 2009, Mal. trap., 1 male, Achterberg and de Vries; Vinh Phuc, Tsam Dao, 1050-1175 m, 14-17. vi. 2007, Mal. trap., 1 male, Achterberg and de Vries.

Caliroa bilobatina Wei, 2002

Hoa Binh, Pa Co Hang Kia Nr., 1327 m, N20°44'36", E104°55'46", 10-24. x. 2009, Mal. trap., 1 male, Achterberg and de Vries; C. Vietnam, Ha Tinh, Vu Quang N. P., 57 m, N18°20'46", E105°26'39", 22 ix. – 06. x. 2009, 1 male, Achterberg and de Vries.

First record for Vietnam.

Neostromboceros chalybeus (Konow, 1908)

Hoa Binh, Pa Co Hang Kia Nr., 1030 m, N20°44'35", E104°53'22", 09-23. x. 2009, 1 female, Achterberg and de Vries.

First record for Vietnam.

Nepala incerta (Cameron, 1876)

Ninh Binh, Cuc Phuong Np., close to park centre, 08. x. 2009, 1 female leg.: E. Gasso Miracle.

Formosempria crassicornis Wei & Nie, 2002

N. Vietnam, Ninh Binh, Cuc Phuong NP., near centre, c. 225 m, 20 xii. 1999 – 10. ii. 2000, 1 female, May Phu Quy.

First record for Vietnam.

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Sawflies of Belső-Somogy (Hymenoptera: Symphyta)

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Haris, A.: *Sawflies of Belső-Somogy (Hymenoptera: Symphyta).*
Abstract: 130 sawfly species are recorded from Belső-Somogy. *Cladius* (*Priophorus*) *nubilus* (Konow, 1897) is recorded firstly in the Carpathian Basin and *Heptamelus ochroleucus* (Stephens, 1835) is first record for Hungary.

Keywords: Belső-Somogy, Hymenoptera, Symphyta, sawflies, new records

Introduction

One of the largest forest-covered area of Hungary is located in the South Western part of Somogy County (South West Hungary). The total investigated area is about 48 000 hectare ranging from Inke, Vése, Iharosberény in the North to Bélavár, Háromfa in the South and from Berzence, Csurgó in the West to Segesd, Somogyszob and Nagyatád in the East (Fig. 1). In total 447.5 hectare is nature conservation area (Baláta Lake and its surrounding).

The sandhills covered surface of the central Western part of Somogy county is originated from the glacial periods. It's altitude varies between 130 and 160 m above the sea level. These sand-dunes consist of acidic sand which is poor in lime. This kind of sand can only be found in Hungary here and in the Nyírség (North Eastern edge of Hungary). In some spots, these sand dunes are covered by clay. In deeper areas, where this clay is accumulated between the dunes, it prevents the infultration of the water to the deeper layers and supports wetlands and moors like Lake Baláta, the largest wetland of Belső-Somogy.

The sand dunes are dominantly covered with Hornbeam, Turkey oak and Sessile oak forests (*Querceto robori-cerris carpinetosum* and *Quercetum robori-cerris pteridietosum*) in the wet areas, the Alder vegetation is dominant. Extensive Scots pine and Black pine plantations take also place on the area with spots of Birch vegetation. Ferns are the dominant underbrush of the dry areas, which consists mainly *Pteridium aquilinum* (Bracken), *Athyrium filix-femina* (Lady fern) and *Dryopteris filix-mas* (Male Fern).

Belső-Somogy belongs to the relatively dry areas of the country. The yearly mean moisture varies between 500 and 600 mm and the yearly mean temperature is 10.0-10.5 °C. The annual sunshine exceeds 2100 hours.

In the Neogene period, the area was floaded by sea accumulating 100-400 m deposite layer. During the middle Miocene, the Southern part of Belső-Somogy elevated, but in the second period of Middle Miocene (Sarmata period in Hungary) the territory started

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to be sunken and covered again by the sea forming about 100 m thick sedimentary layer. In the Pliocene period, the sea is separated and formed a freshwater internal lake. In the upper Pliocene, the area elevated again and rivers piled up their sediments in 300 m thick layer in the Pleistocene. Finally, during the last glacial period (würm glacial) drift sand covered the surface which holds the present vegetation.

Although, the vertebrata fauna is well investigated and a monograph was published by the local museum (KASZA and MARIÁN 2001), we have poor knowledge on the insect fauna of Belső Somogy. Józan published the Aculeata fauna and Bérces the Carabida fauna of the Lake Baláta (JÓZAN 1996, BÉRCES 2002). ÁBRAHÁM and PAPP (1991) recorded an interesting ant-lion species: *Myrmeleon bore* (Tjeder, 1941) firstly in Hungary from this region.

The first published sawfly species from Belső-Somogy is *Dolerus niger* (Linné, 1767) recorded from Nagyatád and published in 1907 by MÓCZÁR and HENTER (1907). Till now, we have only few and sporadic sawfly records from Belső Somogy, (30 species from 5 town and villages) they were published in HARIS (1998, 2001) and in ROLLER and HARIS (2008).

Material and methods

The studied material comprises approximately 500 specimens of 123 species collected in 25 days in 2012. This part of the collection is deposited in the entomological collection of Somogy County Museum. The list of collected sawflies were augmented with 7 other species collected previously by other entomologists and deposited in the Hungarian Natural History Museum, Budapest. I had no possibility to collect in August, in the second largest flight period, therefore few common species are missing from the list.

For identification, Zhelochovtsev's work on the sawflies of the European part of the former USSR (ZHELOCHOVTSEV 1988) was consulted, together with the Fauna Hungariae series (MÓCZÁR and ZOMBORI 1973, ZOMBORI 1982, 1990). We also used some recent revisions to make the identifications even more precise (BLANK and RITZAU 1998, HARIS 2006, VIKBERG and LISTON 2009, ACHTERBERG and AARTSEN 1986 and KOCH 1988).

For the discussion of the distribution of sawflies, we consulted the book of ROLLER and HARIS (2008) titled Sawflies of the Carpathian Basin, History and Current Research and also the most recent European checklists of species (ACHTERBERG, 2004, TAEGER et al., 2006). The higher classification of sawflies, follows the Hymenoptera part of Fauna Europaea (ACHTENBERG 2004). Our references for biological data of sawflies are SCHEDL (1991), TAEGER et. al. (1998), and LISTON (1995).

List of localities

1. Berzence: Alsó-Gyóta erdő (Alsó-Gyóta forest), Western side of Filagoria (Fig. 5 and 7). Between 46°11'45.33"N, 17°13'56.51"E and 46°11'49.19"N, 17°13'45.97"E.
2. Berzence: Alsó-Gyóta erdő (Alsó-Gyóta forest), North of Filagoria, 400 m, left, around 46°11'57.16"N, 17°13'49.79"E.
3. Berzence: Alsó-Gyóta erdő (Alsó-Gyóta forest): Southern side Filagoria (Fig. 5), between 46°11'44.64"N, 17°13'59.04"E and 46°11'35.56"N, 17°14'5.50"E.
4. Bolhás: end of the village towards the Szenta Forest, between 46°15'52.27"N, 17°15'30.55"E and 46°15'57.61"N, 17°15'21.19"E.
5. Bolhás: Felső Filagória, between 46°14'56.68"N, 17°14'10.12"E and 46°14'59.16"N, 17°14'22.18"E.
6. Bolhás: Hókamalom: Fishing pond, between 46°13'24.20"N, 17°16'52.59"E and 46°13'17.34"N, 17°16'51.48"E.

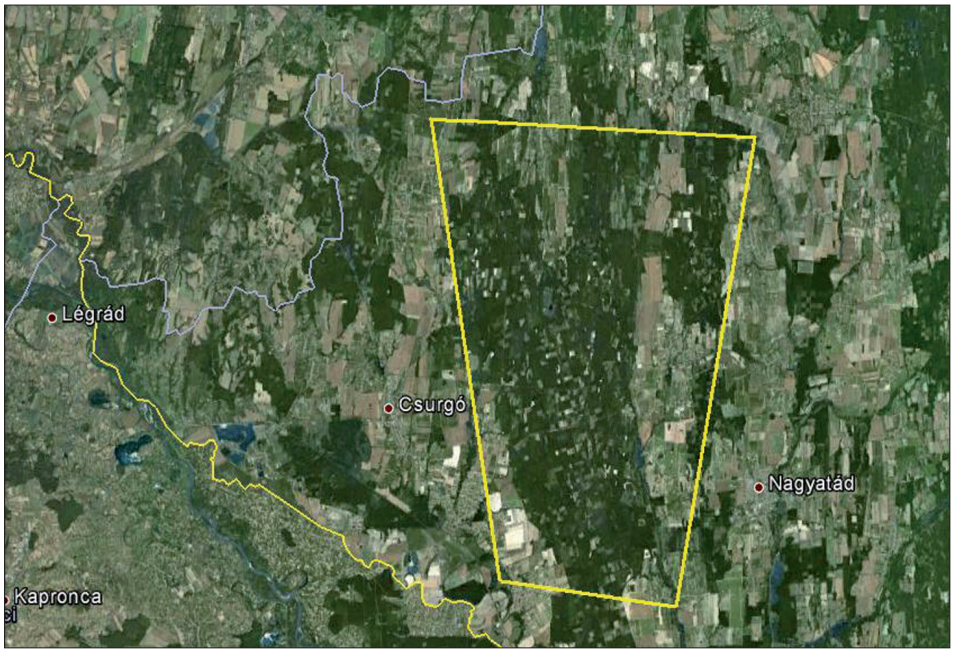

Fig. 1: The investigated area in Belső-Somogy

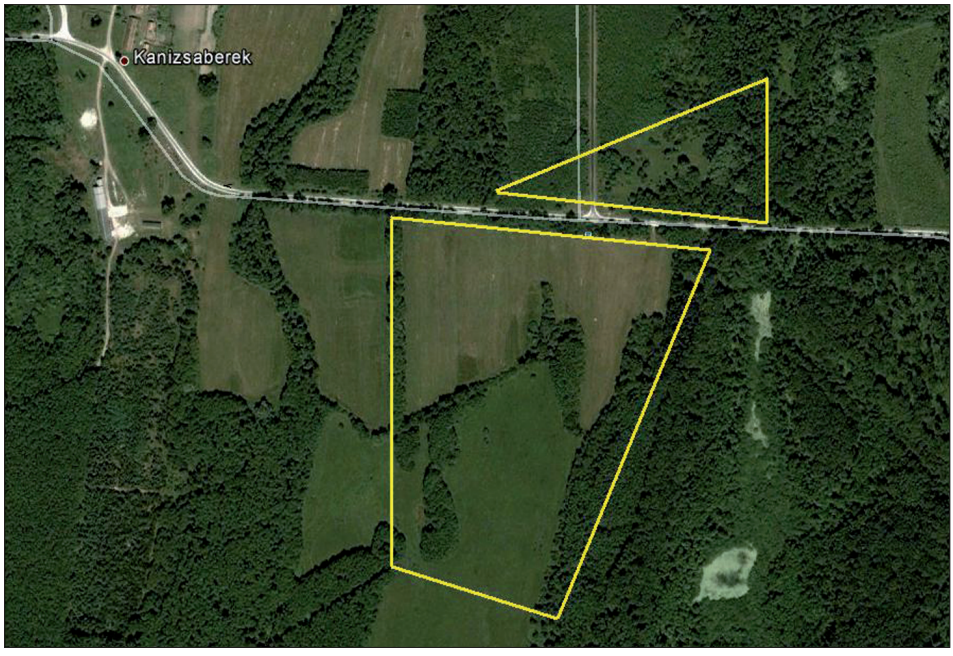

Fig. 2: Kaszó: Kanizsaberek, Southern and Northern parts

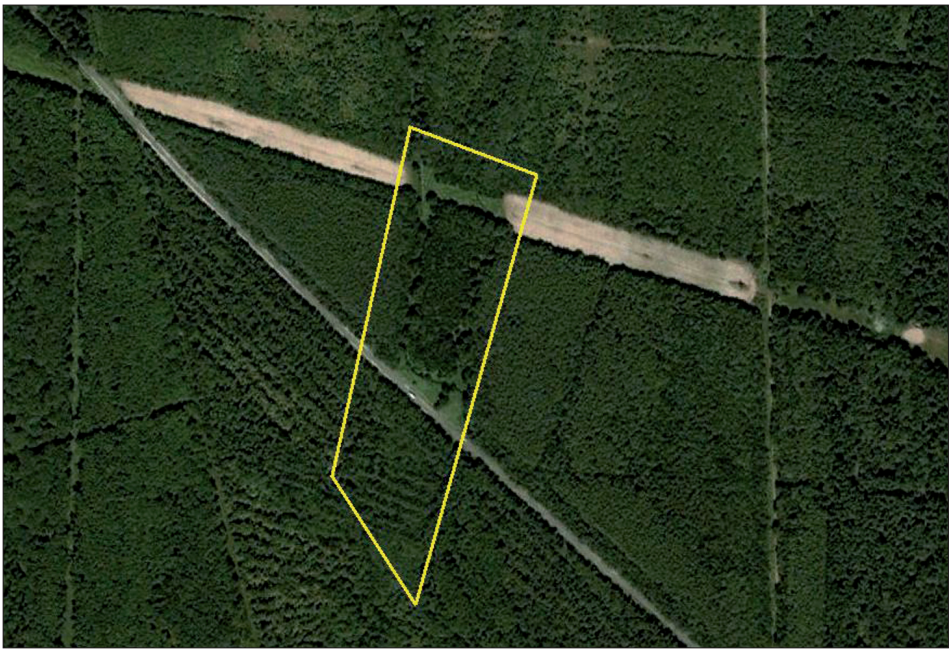

Fig. 3: Kaszó: Bükki forest

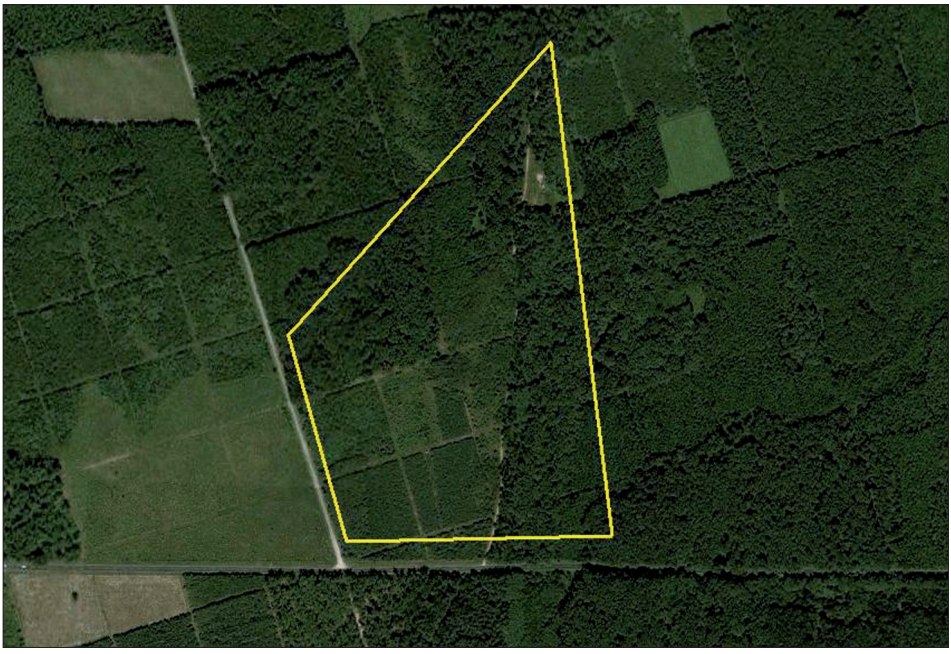

Fig. 4: Szenta: Felső-Gyóta forest

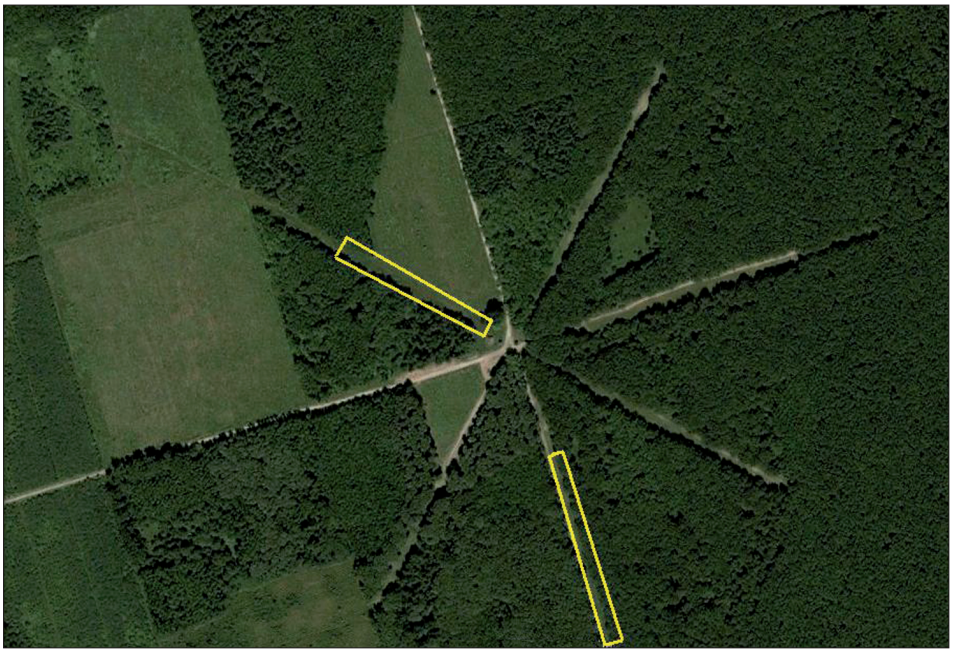

Fig. 5: Berzence: Filagoria Western and Southern parts

Fig. 6: Vése: Csöpröndi road

Fig. 7: Berzence: Filagoria

Fig. 8: Kaszó: Kanizsaberek, Southern part

7. Iharos: Alsó-erdő (Alsó forest), between 46°20'57.65"N, 17°10'17.85"E and 46°20'50.46"N, 17°10'11.37"E.
8. Inke: Darvasi road. Between 46°21'48.25"N, 17°11'54.02"E and 46°21'57.72"N, 17°11'55.01"E.
9. Kaszó: Bükki erdő (Bükki forest), patakpart (bank of brook and its surroundings) (Fig. 3), between 46°18'37.81"N, 17°14'0.55"E and 46°18'45.77"N, 17°13'58.54"E.
10. Kaszó: Kanizsaberrek North (Fig. 2), between 46°19'42.33"N, 17°11'54.91"E and 46°19'46.80"N, 17°12'6.18"E.
11. Kaszó: Kanizsaberrek South (Fig. 2 and 8), between 46°19'41.41"N, 17°12'3.69"E and 46°19'24.72"N, 17°11'47.51" E.
12. Segesd: Alsó Segesdi erdő (Alsó Segesdi forest), forest edges, between 46°19'8.14"N, 17°19'35.23"E and 46°19'5.94"N, 17°19'37.10"E.
13. Segesd: Alsó Segesdi erdő (Alsó Segesdi forest), between 46°19'0.44"N, 17°19'26.66"E and 46°19'6.34"N, 17°19'29.76"E.
14. Segesd: Lászlómajor, (actually close to Lászlómajor, but not exactly in Lászlómajor), 46°22'10.15"N, 17°21'22.63"E and 46°22'11.15"N, 17°21'28.59" E.
15. Somogyszob: Bükki erdő (Bükki forest), between 46°17'47.69"N, 17°15'32.44"E and 46°17'49.29"N, 17°15'38.78"E.
16. Somogyszob: Bükki erdő, entrance of the Kaszó forest, between 46°17'40.67"N, 17°16'8.68"E and 46°17'39.41"N, 17°16'0.03"E.
17. Somogyszob: meadow at Segesd side of the village, between 46°17'58.70"N, 17°17'28.07"E and 46°18'3.10"N, 17°17'29.19"E.
18. Somogyszob: Töröktanya, between 46°15'48.29"N, 17°18'58.00"E and 46°15'54.59"N, 17°19'11.33"E.
19. Szenta: Felső-Gyóta erdő (Felső-Gyóta forest) (Fig. 4), between 46°13'29.72"N, 17°15'5.23"E and 46°13'7.96"N, 17°15'3.13"E.
20. Szenta: Tibor König's grave. 26. 05. 2012. Between 46°18'7.86"N, 17°10'31.86"E and 46°18'10.22"N, 17°10'41.92"E.
21. Tarany: Nagy-erdő, between 46°10'9.41"N, 17°14'46.86"E and 46°10'11.50"N, 17°14'55.37"E.
22. Tarany: Nagy-erdő, Southern part, around 46° 6'58.22"N, 17°16'16.36"E.
23. Vése, Csöpröndi út (Csöpröndi road) (Fig. 6), between 46°24'31.88"N, 17°18'55.08"E and 46°24'29.74"N, 17°18'40.02"E.
24. Vízvár: Komoricai forest, around 46° 8'10.04"N, 17°15'49.63"E.

Results

List of species

Pamphiliidae

Neurotoma nemoralis (Linné, 1758): Berzence: Alsó-Gyóta forest, Filagoria: Western side, 26. 04. 2012, 1 male. Known hostplants: *Prunus mahaleb, P. armeniaca, P. spinosa* and *P. cerasus*. Locally frequent pest.

Pamphilius hortorum (Klug, 1808): Somogyszob: Töröktanya, 26. 04. 2012, 1 female. Sporadic in the Carpathian Basin, rather rare in Hungary. Larva on *Rubus idaeus*.

Pamphilius jucundus (Eversmann, 1847): Vése: Csöpröndi road, 27. 04. 2012, 1 female. Rare in the Carpathian Basin.

Pamphilius sylvaticus (Linné, 1758): Bolhás: Felső Filagória, 19. 04. 2012, 1 female, Kaszó: Kanizsaberek North, 23. 04. 2012, 1 female, Tarany: Nagy-erdő (Nagy forest), South, 10. 05. 2012, 1 female. One of the commonest sawfly species. Hostplants: *Sorbus aucupariae, Malus* spp., *Prunus* spp. and *Crataegus* spp.

Pamphilius vafer (Linné, 1767): Tarany: Nagy forest, South, 06. 05. 2012. 05. 14, 1 female. Sporadic. Known hostplants: *Alnus glutinosa, Alnus incana, Alnus fruticosa, Betula pendula* and *Betula pubescens*.

Cimbicidae

Abia nitens (Linné, 1758): Somogyszob (ROLLER and HARIS 2008). Sporadic. Hostplant: *Scabiosa columbaria*.

Corynis crassicornis (Rossi, 1790): Szenta (in ROLLER and HARIS 2008). Sporadic. Hostplants: *Sedum acre* and *Sedum album*. Imagoes frequently visits flowers of *Ranunculus* spp.

Trichiosoma lucorum (Linné, 1758): Kaszó: Kanizsaberek North, 19. 04. 2012, 1 female. Rare in Hungary, known from Budapest: Németvölgy, Budapest: Csepel, Kalocsa, Kőszegi mountains, Budapest: Újpest and Pócsmegyer. Known hostplants: B*etula pubescens, Betula pendula, Salix aurita and Salix fragilis* and probably *Padus avium*.

Diprionidae

Gilpinia hercyniae (Hartig, 1837): Vése: Csöpröndi road, 27. 05. 2012, 1 female. Sporadic in Hungary. Larva on *Picea abies*, rarely on *Abies alba*.

Blasticotomidae

Blasticotoma filiceti Klug, 1834: Szenta: Felső-Gyóta erdő (Felső-Gyóta forest), 06. 05. 2012, 1 female, Berzence: Alsó-Gyóta erdő (Alsó-Gyóta forest) (Alsó-Gyóta forest): Filagoria Southern side, 06. 05. 2012, 1 female. Rare.

Argidae

Aproceros leucopoda Takeuchi, 1939: Kaszó: Kanizsaberek South, 23. 04. 2012, 1 female. Frequent. Larva on *Ulmus* spp. Recently invaded Europe, known from Hungary, Poland, Slovakia, Austria, Romania, Ukraine and the Russian Far East (BLANK et al. 2010, CSÓKA et al. 2010).

Arge cyanocrocea (Forster, 1771): Segesd: Alsó Segesdi forest, 05. 05. 2012, 1 female, 06. 05. 2012, 1 female, Szenta: Felső-Gyóta forest, 06. 05. 2012, 1 female, 05. 05. 2012, 1 male, Berzence: Alsó-Gyóta forest: Filagoria: Western side, 26. 04. 2012, 2 males, 05. 05. 2012, 1 male, 06. 05. 2012, 1 male, 10. 05. 2012, 1 male, Somogyszob: Segesdi road, meadow, 05. 05. 2012, 1 male, Vése: Csöpröndi road, 26. 05. 2012, 1 female. Common species. Known hostplants: *Rubus idaeus* and *Sanguisorba officinalis*.

Arge melanochra (Gmelin, 1790): Vése: Csöpröndi road, 26. 05. 2012, 1 female, 27. 05. 2012, 2 males. Common species. Hostplant: *Crataegus oxycantha*.

Arge pagana pagana (Panzer, 1798): Szenta: Felső-Gyóta forest, 10. 05. 2012, 1 female, 20. 05. 2012, 1 female. Frequent. Hostplants: *Rosa* spp.

Arge ustulata (Linnaeus, 1758): Somogyszob (ROLLER and HARIS 2008). Sporadic. Larva on S*alix alba vitellina, Salix alba, Salix aurita, Salix fragilis, Salix caprea, Betula pendula, Betula pubescens* and *Crataegus* spp.

Cephidae

Calameuta (*Calameuta*) *filiformis* (Eversmann, 1847): Somogyszob: edges of Bükki-forest, 05. 05. 2012, 1 female. Generally common species. Larva lives in stems of *Arrhenaterum elatius, Phalaris arundinacea, Calamagrostis epigeios, Elytrigia repens* and *Phragmites communis*.

Calameuta (*Calameuta*) *haemorrhoidalis* (Fabricius, 1781): Segesd: Lászlómajor, 27. 04. 2012, 1 female, 28. 04. 2012, 1 male. Segesd: Alsó Segesdi forest, forest edges, 28. 04. 2012, 1 female, Segesd: Alsó Segesdi forest, forest edges, 27. 04. 2012, 1 male, Somogyszob: Segesdi road, meadow, 27. 04. 2012, 1 male. Frequent species. Hostplant unknown.

Calameuta (*Calameuta*) *pallipes* (Klug, 1803): Segesd: Alsó Segesdi forest, forest edges, 27. 04. 2012, 1 male, 28. 04. 2012, 1 male, 1 female, 05. 05. 2012, 1 female, Berzence: Alsó-Gyóta forest: Filagoria: Western side, 06. 05. 2012, 1 male, Tarany: Nagy-erdő (Nagy forest), 06. 05. 2012, 1 female. Frequent species. Hostplants: diverse *Poaceae*.

Calameuta (*Calameuta*) *punctata* (Klug, 1803): Segesd: Lászlómajor, 26. 04. 2012, 1 female, Somogyszob: Segesdi road, meadow, 28. 04. 2012, 1 female. Sporadic in Hungary.

Cephus nigrinus C. G. Thomson, 1871: Segesd: Alsó Segesdi forest, edges of forest, 27. 04. 2012, 1 female, Somogyszob: out of the village, towards Segesd, 23. 04. 2012, 1 male, Kaszó: Bükki erdő (Bükki forest), brook, 27. 04. 2012, 1 male. Frequent species. Hostplants: *Milium effusum* and *Poa pratensis*.

Cephus pygmeus (Linné, 1767): Segesd: Lászlómajor, 28. 04. 2012, 1 female, 1 male, 10. 05. 2012, 1 male, 27. 04. 2012, 1 female, Tarany: Nagy-erdő (Nagy forest), 06. 05. 2012, 1 male, Kaszó: Kanizsaberek South, 27. 04. 2012, 1 female, Somogyszob: Segesdi road, meadow, 05. 05. 2012, 1 female, 19. 05. 2012, 1 female, Somogyszob: edges of Bükki-forest, 11. 05. 2012, 1 female, Szenta: Felső-Gyóta forest, 10. 05. 2012, 1 female, Vése: Csöpröndi road, 27. 05. 2012, 3 females. Common. Insect pest of cereals and *Graminae*.

Cephus spinipes (Panzer, 1800) (syn. *Cephus cultratus* Eversmann, 1847): Segesd: Alsó Segesdi forest, 06. 05. 2012, 1 male, Szenta: Tibor König's grave. 26. 05. 2012, 1 male. Frequent species. Known hostplant: *Phleum pratense*.

Janus compressus (Fabricius, 1793): Szenta: Felső-Gyóta forest, 05. 05. 2012, 1 male. Frequent insect pest in orchards but imagoes were sporadically collected. Larvae in shoots of *Pyrus* and *Malus* spp.

Tenthredinidae

Dolerinae

Dolerus (*Achaetoprion*) *madidus* (Klug, 1818): Inke, 31. 03. 2012, 3 females. Sporadic. Larva on *Juncus effusus*.

Dolerus (*Achaetoprion*) *triplicatus* (Klug, 1818): Kaszó: Bükki erdő (Bükki forest), 21. 04. 2012, 1 male, Berzence: Alsó-Gyóta forest, Filagoria: Western side, 26. 04. 2012, 1 male, 06. 05. 2012, 1 female, 10. 05. 2012, 2 females, 11. 05. 012, 1 female, Szenta: Felső-Gyóta forest, 11. 05. 2012, 1 female. Sporadic. Larva on *Juncus filiformis* and *J. effusus*.

Dolerus (*Dicrodolerus*) *vestigialis* (Klug, 1818): Kaszó: Kanizsaberek South, 27. 04. 2012, 1 female, Kaszó: Kanizsaberek North, 27. 04. 2012, 1 male, Somogyszob: Bükki forest, forest edge, 28. 04. 2012, 1 female, Tarany: Nagy-erdő (Nagy forest), 05. 05. 2012, 1 female, Segesd: Lászlómajor, 26. 04. 2012, 1 male. Common. Hostplants: *Equisetum palustre, E. sylvaticum, E. arvense* and *E. pratense*.

Dolerus (*Dolerus*) *germanicus* (Fabricius, 1775): Segesd: Lászlómajor, 15. 04. 2012, 1 male, 19. 04. 2012, 1 female, 28. 04. 2012, 1 female, Szenta: Tibor König's grave. 26. 05. 2012, 1 male, Kaszó: Kanizsaberek North, 26. 05. 2012, 1 male. Common. Larva on *Equisetum arvense* and *E. palustre*.

Dolerus (*Oncodolerus*) *eversmanni* W. F. Kirby, 1882: Kaszó: Kanizsaberek North, 27. 04. 2012, 1 female, Segesd: Lászlómajor, 05. 05. 2012, 1 male. Frequent. Larva on *Equisetum arvense* and *E. palustre*.

Dolerus (*Poodolerus*) *aeneus* Hartig, 1837: Szenta: Felső-Gyóta forest, 19. 04. 2012, 1 female, 06. 05. 2012, 1 female, Berzence: Alsó-Gyóta erdő (Alsó-Gyóta forest): Filagoria: Southern side, 06. 05. 2012, 1 female. Sporadic. Hostplants: *Graminae*.

Dolerus (*Poodolerus*) *gonager* (Fabricius, 1781): Kaszó: Kanizsaberek North, 31. 03. 2012, 1 female, 21. 04. 2012, 1 male, Somogyszob: Segesdi road, meadow, 15. 04. 2012, 1 female, Segesd: Alsó Segesdi forest, 15. 04. 2012, 1 female. Common. Larva on *Graminae*.

Dolerus (*Poodolerus*) *niger* (Linné, 1767): Tarany: Nagy-erdő (Nagy forest), 05. 05. 2012, 1 female, Szenta: Felső-Gyóta forest, 11. 05. 2012, 1 female, Berzence: Alsó-Gyóta forest, Filagoria: Western side, 19. 05. 012, 1 female, 26. 05. 2012, 1 female. Sporadic. Larva on *Graminae*.

Dolerus (*Poodolerus*) *nigratus* (O. F. Müller, 1776): Kanizsaberek North, 31. 03. 2012, 1 female, 19. 04. 2012, 1 male, Kanizsaberek South, 31. 03. 2012, 1 female, 1 male, Somogyszob: Segesdi road, meadow, 27. 04. 2012, 1 female, 28. 04. 2012, 1 female, 05. 05. 2012, 1 female, 15. 04. 2012, 2 males, 19. 04. 2012, 1 male, Szenta: Felső-Gyóta forest, 05. 05. 2012, 1 female, 19. 04. 2012, 1 male, Berzence: Alsó-Gyóta erdő (Alsó-Gyóta forest): Filagoria Southern side, 05. 05. 2012, 1 female, 06. 05. 2012, 1 female, 10. 05. 2012, 1 female, Berzence: Alsó-Gyóta forest: Filagoria: Western side, 06. 05. 2012, 1 female, 10. 05. 2012, 1 female, 11. 05. 012, 1 female, 19. 05. 012, 1 female, 26. 04. 2012, 1 male, Segesd: Lászlómajor, 14. 04. 2012, 1 male, Tarany: Nagy-erdő (Nagy forest), 06. 05. 2012, 1 male. Common. Larva on *Graminae* including cereals.

Dolerus (*Poodolerus*) *picipes* (Klug, 1818): Kaszó: Kanizsaberek South, 10. 05. 2012, 2 females, Kaszó: Kanizsaberek North, 21. 04. 2012, 1 male, 23. 04. 2012, 1 male, Bolhás: Felső Filagória, 19. 04. 2012, 1 male, Tarany: Nagy-erdő (Nagy forest), 05. 05. 2012, 1 male. Frequent. Larva on *Graminae*.

Dolerus (*Poodolerus*) *puncticollis* C. G. Thomson, 1871: Vése, Csöpröndi road, 27. 04. 2012, 1 female, Kaszó: Kanizsaberek North, 31. 03. 2012, 1 male, Kaszó: Kanizsaberek South, 19. 04. 2012, 1 male. Common. Larva on *Graminae* including cereals.

Dolerus (*Poodolerus*) *sanguinicollis* (Klug, 1818): Bolhás: Hókamalom: Fishing pond, 10. 05. 2012, 1 female. Sporadic.

Dolerus (*Poodolerus*) *stygius* Förster, 1860 (syn. *D. megapterus* Cameron, 1881) : Kaszó: Kanizsaberek North, 19. 04. 2012, 1 male. Rare.

Selandrinae

Aneugmenus coronatus (Klug, 1818): Szenta: Felső-Gyóta forest, 05. 05. 2012, 1 female, 06. 05. 2012, 1 female, 19. 05. 2012, 1 female. Rare. Larva on *Dryopteris filix-mas, Aspidium* sp., *Athyrium filix-femina* and *Pteridium aquilinum*.

Aneugmenus padi (Linnaeus, 1761): Segesd: edges of Alsó Segesdi forest, 10. 05. 2012, 1 female. Hostplants: *Asplenium* sp. and *Pteridium aquilinum*. Sporadic in the Carpathian Basin, but rare in Hungary. Known from Szeged, Szulok, the Mecsek mountains and Fenyőfő.

Heptamelus ochroleucus (Stephens, 1835): Szenta: Felső-Gyóta forest, 19. 05. 2012, 1 female. Rare. New record for Hungary.

Nesoselandria morio (Fabricius, 1781): Berzence: Alsó-Gyóta erdő (Alsó-Gyóta forest), Filagoria Southern side, 26. 05. 2012, 1 male. Frequent. Hostplants: *Brachytecium reflexum, Ceratodon purpureus, Chenopodium album, Dicranum scoparium, Fragaria vesca, Hedwigia ciliata, Myosotis arvensis, Plagiomnium cuspidatum, Plagiothecium denticulatum, Polygonum aviculare, Polytrichum commune, Pseudobryum cinclidiodes, Sanionia uncinata, Stellaria media, Veronica chamaedrys* and *V. officinalis*.

Selandria serva (Fabricius, 1793): Szenta: Felső-Gyóta erdő (Felső-Gyóta forest), 26. 04. 2012, 1 male, 05. 05. 2012, 1 male, 27. 05. 2012, 1 female. Frequent. Host plants: *Poaceae, Carex* spp. and *Juncus* spp.

Stromboceros delicatulus (Fallén, 1808): Szenta: Felső-Gyóta forest, 05. 05. 2012, 1 male, 06. 05. 2012, 3 males, 26. 05. 2012, 1 male. Rare. Larva on *Pteridium aquilium, Athyrium filix-femina, Onoclea struthiopteridis* and *Polypodium vulgare*.

Strongylogaster multifasciata (Geoffroy, 1985): Szenta: Felső-Gyóta erdő (Felső-Gyóta forest), 06. 05. 2012, 1 female, 19. 04. 2012, 1 female, 26. 04. 2012, 1 female, Somogyszob: Bükki erdő (Bükki forest), 28. 04. 2012, 1 female. Frequent. Hostplants: *Dryopteris* sp., *Matteuccia struthiopteris, Aspidium* sp., *Polystichum* sp. and *Pteridium aquilinum*.

Allantinae

Allantus (*Emphytus*) *calceatus* (Klug, 1818): Kaszó: Kanizsaberek South, 14. 04. 2012, 1 male. Sporadic. Hostplants: *Rubus, Sanguisorba, Rosa, Filipendula, Fragaria* and *Alchemilla* spp.

Allantus (Emphytus) *cinctus* (Linné, 1758): Kaszó: Bükki forest, 21. 04. 2012, 1 female. Frequent. Hostplants: *Rosa* spp.

Allantus (*Emphytus*) *melanarius* (Klug, 1818): Vése, Csöpröndi road, 27. 04. 2012, 1 female. Frequent. Hostplant: *Cornus sanguinea*.

Ametastegia (*Ametastegia*) *equiseti* (Fallén, 1808): Berzence: Alsó-Gyóta erdő (Alsó-Gyóta forest): Filagoria Southern side, 06. 05. 2012, 1 male, Szenta: Felső-Gyóta erdő (Felső-Gyóta forest), 19. 05. 2012, 1 male, 20. 05. 2012, 1 male. Frequent. Larva on *Chenopodium album, Lythrum salicaria, Polygonum persicaria* and *Rumex acetosella*.

Ametastegia (*Ametastegia*) *glabrata* (Fallén, 1808): Inke: Road to Darvas, 15. 04. 2012, 1 male. Frequent. Hostplants: *Rumex acetosella, Rumex crispus, Rumex longifolius, Bidens* sp., *Chenopodium* sp., *Lythrum salicaria, Plantago* sp., *Rheum rhabarbarum, Ribes* sp., *Salix* sp., *Solanum dulcamara, Viola* sp., *Epilobium* sp., *Fagopyrum* sp., *Solanum tuberosum, Vicia* sp. and *Polygonum aviculare*.

Athalia bicolor Serville, 1823: Berzence: Alsó-Gyóta forest: Filagoria South, 06. 05. 2012, 1 female, Tarany: Nagy-erdő (Nagy forest), South, 10. 05. 2012, 1 female, Kaszó: Kanizsaberek South, 10. 05. 2012, 1 female. Frequent. Hostplant unknown.

Athalia circularis (Klug, 1815): Segesd: Lászlómajor, 28. 04. 2012, 1 female, Somogyszob: meadow at Segesd side of the village, 26. 04. 2012, 1 female, Szenta: Felső-Gyóta forest, 11. 05. 2012, 1 female, 1 male, 19. 05. 2012, 1 female, 26. 05. 2012, 2 males, Bolhás: Hókamalom: Fishing pond, 10. 05. 2012, 1 female, 19. 05. 2012, 1 male, Kaszó: Kanizsaberek South, 26. 05. 2012, 1 female. Frequent. Hostplants: *Arctium lappa, Ajuga reptans, Veronica beccabunga, V. longifolia, V. officinalis, Alliaria petiolata, Glechoma hederacea, Melampyrum, Capsella* and *Lycopus* spp.

Athalia cordata Serville, 1823: Segesd: edges of Alsó Segesdi forest, 23. 04. 2012, 1 female, Segesd: Lászlómajor, 26. 04. 2012, 1 female, 27. 04. 2012, 1 male, Kaszó: Iharosi út road, 1.7 km from Kanizsaberek, 21. 04. 2012, 1 female, Somogyszob: entrance of Bükki-forest, 05. 05. 2012, 1 female, Szenta: Felső-Gyóta forest, 11. 05. 2012, 1 female, Inke: Darvasi road, 27. 04. 2012, 1 male, Tarany: Nagy-erdő (Nagy forest), 05. 05. 2012, 1 male, Vízvár: Komoricai forest, 06. 05. 2012, 1 male. Common. Larva on *Misopates orontinum, Antirrhinum majus, Ajuga reptans, Teucrium scorodonia* and *Plantago* spp.

Athalia liberta (Klug, 1815): Segesd: Alsó Segesdi forest, 23. 04. 2012, 1 male, Szenta: Felső-Gyóta forest, 19. 05. 2012, 1 male. Frequent. Feeding on *Alliaria petiolata, Arabidopsis thaliana, Cardamine hirsuta and Sisymbrium officinale*.

Athalia lugens (Klug, 1815): Segesd: Lászlómajor, 05. 05. 2012, 1 male, Berzence: Alsó-Gyóta forest, Filagoria West, 10. 05. 2012, 1 male, Szenta: Felső-Gyóta forest, 20. 05. 2012, 1 male. Sporadic. Feeding on various *Cruciferae*.

Athalia rosae (Linné, 1758): Segesd: Lászlómajor, 28. 04. 2012, 4 females, Inke: Darvasi road, 27. 04. 2012, 4 females, 3 males, Vése: Csöpröndi road, 20. 05. 2012, 1 female. Common pest. Hostplants: *Raphanus sativus, R. raphanistrum, Sinapis arvensis, Sisymbrium officinale, Armoracia rusticana, Barbarea sp., Brassica napus, B. juncea, B. rapa, B. oleracea, Tropaeolum majus, Sinapis arvensis, Alliara petiolata* and *Cardamine* spp.

Empria liturata (Gmelin, 1790): Inke: Darvasi road, 15. 04. 2012, 2 females, 27. 04. 2012, 1 female, Szenta: Felső-Gyóta forest: Filagoria, Western side, 19. 04. 2012, 1 male, Segesd: edges of Alsó Segesdi forest, 21. 04. 2012, 1 male, Somogyszob: Töröktanya , 26. 04. 2012, 1 male. Frequent. Hostplants: *Fragaria* and *Geum* spp.

Empria sexpunctata (Serville, 1823) (syn.: *Empria klugii* (Stephens, 1835)): Segesd: edges of Alsó Segesdi forest, 23. 04. 2012, 1 female, 27. 04. 2012, 1 male, Szenta: Felső-Gyóta forest, 06. 05. 2012, 1 female, Vízvár: Komoricai forest, 06. 05. 2012, 1 female, Kaszó: Bükki forest, brook (patakpart), 27. 04. 2012, 1 male. Frequent. Larva on *Geum* spp.

Empria tridens (Konow, 1896): Szenta: Felső-Gyóta erdő (Felső-Gyóta forest), Filagoria: Western side, 19. 04. 2012, 1 female. Frequent. Hostplants: *Geum* spp. and *Rubus idaeus*.

Eriocampa ovata (Linné, 1761): Szenta: Felső-Gyóta forest, 20. 05. 2012, 1 female, 26. 05. 2012, 1 female. Frequent on *Alnus glutinosa* and *A. incana*.

Eriocampa umbratica (Klug, 1816): Kaszó: Bükki forest, 14. 04. 2012, 1 male, Kaszó: Kanizsaberek South, 15. 04. 2012, 1 male, 27. 04. 2012, 1 male, Kaszó: Kanizsaberek North, 21. 04. 2012, 2 males, 23. 04. 2012, 2 females, Segesd: edges of Alsó Segesdi forest, 23. 04. 2012, 1 male, 26. 04. 2012, 1 male, Berzence: Alsó-Gyóta forest, Filagoria: Western side, 26. 04. 2012, 1 male, Bolhás: Szenta Forest, 28. 04. 2012, 2 males, Somogyszob: Bükki forest, 28. 04. 2012, 1 male, Kaszó: Bükki forest, 21. 04. 2012, 1 female, Vése, Csöpröndi road, 21. 04. 2012, 1 female, Szenta: Felső-Gyóta erdő (Felső-Gyóta forest), 26. 04. 2012, 1 female, Bolhás: Hókamalom: Fishing pond, 10. 05. 2012, 1 female. Frequent on *Alnus glutinosa* and *A. incana*.

Taxonus agrorum (Fallén, 1808): Bolhás: Felső Filagória, 19. 04. 2012, 1 female, Segesd: edges of Alsó Segesdi forest, 27. 04. 2012, 1 female, Somogyszob: Töröktanya 28. 04. 2012, 1 female, Somogyszob: Bükki forest, 28. 04. 2012, 1 female, Szenta: Felső-Gyóta erdő (Felső-Gyóta forest), Filagoria: Western side, 19. 04. 2012, 1 male, 05. 05. 2012, 1 male, Bolhás: Szenta Forest, 28. 04. 2012, 1 male.

Heterarthrinae

Caliroa varipes (Klug, 1816): Segesd: Alsó Segesdi forest, 21. 04. 2012, 1 male, Berzence: Alsó-Gyóta erdő (Alsó-Gyóta forest), Filagoria Southern side, 26. 05. 2012, 1 male. Sporadic. Larva on *Quercus robur*.

Endelomya aethiops (Fabricius, 1781): Segesd: Alsó Segesdi forest, 19. 04. 2012, 1 female, Kaszó: Kanizsaberek South, 27. 04. 2012, 1 female. Sporadic. Larva on *Rosa* spp.

Heterarthrus vagans (Fallén, 1808): Berzence: Alsó-Gyóta erdő (Alsó-Gyóta forest), Filagoria: Western side, 19. 05. 2012, 1 female. Sporadic. Hostplants: *Alnus* spp.

Profenusa pygmaea (Klug, 1816): Vése, Csöpröndi road, 05. 05. 2012, 1 female. Sporadic. Hostplants: *Quercus* spp.

Blennocampinae

Blennocampa phyllocolpa Viitasaari & Vikberg, 1985 (= *Blennocampa pusilla* (Klug, 1816)): Tarany: Nagy-erdő (Nagy forest), South, 10. 05. 2012, approximately 50 leaf-rolls on one Rosa sp. bush. Frequent. Larva rolls the leaves of *Rosa* spp.

Claremontia alternipes (Klug, 1816): Segesd: Alsó Segesdi forest, 19. 04. 2012, 1 female, 27. 04. 2012, 1 female, 23. 04. 2012, 1 male, Segesd: Alsó Segesdi forest, forest edges, 26. 04. 2012, 3 females, Kaszó: Bükki forest, 21. 04. 2012, 1 female, 27. 04. 2012, 1 female, Kaszó: Kanizsaberek North, 27. 04. 2012, 1 female. Sporadic. Hostplant: *Rubus idaeus*.

Claremontia brevicornis (Brischke, 1883): Kaszó: Kanizsaberek North, 31. 03. 2012, 1 female, Inke: Darvasi road, 31. 03. 2012, 1 female, Segesd: Alsó Segesdi forest, edges of forest, 23. 04. 2012, 1 female, Kaszó: Bükki forest, 23. 04. 2012, 1 male. Sporadic. Hostplants: *Fragaria* spp., *Sanguisorba* spp. and *Potentilla reptans*.

Claremontia waldheimii (Gimmerthal, 1847): Segesd: Alsó Segesdi forest, 21. 04. 2012, 1 male, Vése, Csöpröndi road, 21. 04. 2012, 1 male. Frequent. Hostplant: *Geum urbanum*.

Eutomostethus ephippium (Panzer, 1798): Somogyszob: meadow at Segesd side of the village, 26. 04. 2012, 2 males, 27. 04. 2012, 1 male, 28. 04. 2012, 1 male, Somogyszob: Töröktanya, 28. 04. 2012, 1 female, Segesd: Alsó Segesdi forest, edge of forest, 26. 04. 2012, 2 males, Kaszó: Kanizsaberek South, 23. 04. 2012, 1 male, 27. 04. 2012, 3 males, 1 female, 10. 05. 2012, 1 male, 20. 05. 2012, 1 male, 26. 05. 2012, 1 male, Iharos: Alsó-erdő (Alsó forest), 21. 04. 2012, 1 male, Kaszó: Iharosi road, 21. 04. 2012, 1 male, Kaszó: Bükki forest, 27. 04. 2012, 1 male, 1 female, Inke: Darvasi road, 27. 04. 2012, 1 male, Somogyszob: Töröktanya, 28. 04. 2012, 1 male, Szenta: Felső-Gyóta forest, 05. 05. 2012, 1 male, 26. 05. 2012, 1 male, 27. 05. 2012, 1 male, 1 female, 10. 05. 2012, 1 female, 11. 05. 2012, 1 female, 19. 05. 2012, 2 females, 20. 05. 2012, 2 females, Berzence: Alsó-Gyóta erdő (Alsó-Gyóta forest): Filagoria: Western side, 05. 05. 2012, 1 male, 19. 05. 2012, 1 female, Berzence: Alsó-Gyóta erdő (Alsó-Gyóta forest): Filagoria Southern side, 05. 05. 2012, 2 males, 06. 05. 2012, 1 male, 10. 05. 2012, 1 male, 26. 05. 2012, 1 male, Berzence: Alsó-Gyóta forest, North of Filagoria, 20. 05. 2012, 1 male. Common species. Larva on *Graminae*.

Eutomostethus gagathinus (Klug, 1816): Berzence: Alsó-Gyóta erdő (Alsó-Gyóta forest), Filagoria: Western side, 20. 05. 2012, 1 female, Berzence: Alsó-Gyóta erdő (Alsó-Gyóta forest): Filagoria Southern side, 05. 05. 2012, 2 males, 10. 05. 2012, 1 male, Vése: Csöpröndi road, 26. 05. 2012, 1 female. Sporadic.

Eutomostethus luteiventris (Klug, 1816): Somogyszob: Segesdi road, meadow, 15. 04. 2012, 1 female, 19. 04. 2012, 3 females, 23. 04. 2012, 1 female, 26. 04. 2012, 1 female, 27. 04. 2012, 1 female, Kaszó: Bükki forest, 15. 04. 2012, 1 female, Kaszó: Kanizsaberek South, 15. 04. 2012, 1 female, 27. 04. 2012, 3 females, Szenta: Felső-Gyóta forest, 2 females, 26. 04. 2012, 2 females, 10. 05. 2012, 1 female, 11. 05. 2012, 2 females, 05. 05. 2012, 2 females, Inke, 19. 04. 2012, 1 female, 26. 04. 2012, 1 female, Vése, Csöpröndi road, 21. 04. 2012, 2 females, 27. 04. 2012, 1 female, Berzence: Alsó-Gyóta forest, Filagoria: Western side, 26. 04. 2012, 1 female, 05. 05. 2012, 3 females, 06. 05. 2012, 6 females, 10. 05. 2012, 6 females, 11. 05. 2012, 1 female, Berzence: Alsó-Gyóta forest: Filagoria Southern side, 05. 05. 2012, 2 females, Somogyszob: edge of Bükki forest, 28. 04. 2012, 1 female, Tarany: Nagy forest, 06. 05. 2012, females. Locally frequent, one of the dominant species of Belső Somogy. Larva on *Juncus effusus*.

Eutomostethus punctatus (Konow, 1887): Szenta: Felső-Gyóta forest, 11. 05. 2012, 3 females, 19. 05. 2012, 1 female, 05. 05. 2012, 1 male, 19. 05. 2012, 1 male, Berzence: Alsó-Gyóta forest: Filagoria Southern side, 10. 05. 2012, 1 female, 05. 05. 2012, 1 male, 06. 05. 2012, 1 male, Kaszó: Kanizsaberek South, 20. 05. 2012, 2 females, Vízvár: Komoricai forest, 06. 05. 2012, 1 male. Sporadic species, relatively frequent in Belső Somogy. Hostplant: *Carex paniculata*.

Halidamia affinis (Fallén, 1807): Kaszó: Bükki forest, 27. 04. 2012, 1 female, Somogyszob: Töröktanya, 26. 04. 2012, 2 females, 19. 04. 2012, 1 female. Frequent. Hostplants: *Galium aparine* and *G. molugo*.

Monophadnoides ruficruris (Brulle, 1832): Kaszó: Kanizsaberek North, 14. 04. 2012, 1 female, 31. 03. 2012, 1 male, 21. 04. 2012, 1 male, Segesd: Alsó Segesdi forest, 15. 04. 2012, 1 female. Sporadic. Hostplant: *Rubus idaeus*.

Monophadnus pallescens (Gmelin, 1790): Vése, Csöpröndi road, 21. 04. 2012, 2 females, Segesd: Alsó Segesdi forest, forest edges, 28. 04. 2012, 1 female, Kaszó: Kanizsaberek South, 23. 04. 2012, 1 female, Kaszó: Bükki forest, 23. 04. 2012, 1 male. Common. Hostplants: *Ranunculus acris, R. repens, R. lanuginosus* and *Anemone nemorosa*.

Phymatocera aterrima (Klug, 1816): Szenta: Felső-Gyóta forest, 05. 05. 2012, 1 female. Frequent. Hostplants: *Polygonatum* spp.

Rhadinoceraea (*Rhadinoceraea*) *micans* (Klug, 1816): Kaszó: Bükki forest, 15. 04. 2012, 1 female. Sporadic species but rare in Hungary. Reported only from Kőszeg, Simontornya, Budapest and Nadap. Larva on *Iris laevigatus, Iris pseudacorus* and *Iris spuria*.

Stethomostus fuliginosus (Schrank, 1781): Kaszó: Bükki forest, 21. 04. 2012, 1 male, Kaszó: Kanizsaberek South, 27. 04. 2012, 1 male, 20. 05. 2012, 1 male, Inke: Darvasi road, 27. 04. 2012, 2 males. Frequent. Larva on *Ranunculus acris*, *R. repens* and *R. sceleratus*.

Tomostethus nigritus (Fabricius, 1804): Kaszó: Kanizsaberek North, 19. 04. 2012, 1 male. Sporadic. Hostplant: *Fraxinus excelsior*.

Tenthredininae

Aglaostigma (*Astochus*) *aucupariae* (Klug, 1817): Segesd: Alsó Segesdi forest, 06. 04. 2012, 1 male, 23. 04. 2012, 1 female, Vése, Csöpröndi road, 21. 04. 2012, 1 male, Kaszó: Bükki forest, 21. 04. 2012, 1 female, 27. 04. 2012, 1 female, Vízvár: Komoricai forest, 06. 05. 2012, 1 female. Common. Larva on *Galium mollugo* and *G. boreale*.

Aglaostigma (*Astochus*) *fulvipes* (Scopoli, 1763): Segesd: Alsó Segesdi forest, 15. 04. 2012, 1 male, 19. 04. 2012, 1 male, 23. 04. 2012, 2 males, Segesd: edges of Alsó Segesdi forest, 21. 04. 2012, 1 male, 28. 04. 2012, 1 female, 05. 05. 2012, 1 male, Kaszó: Bükki forest, 15. 04. 2012, 1 male, 21. 04. 2012, 2 males, 26. 04. 2012, 1 male, Szenta: Felső-Gyóta forest, 26. 04. 2012, 1 male, Somogyszob: Segesdi road: meadow, 19. 04. 2012, 1 female, 27. 04. 2012, 1 female, Kaszó: Kanizsaberek North, 27. 04. 2012, 1 female, Somogyszob: Töröktanya , 28. 04. 2012, 1 female. Common. Larva on *Galium mollugo* and *G. verum*.

Macrophya (*Macrophya*) *albicincta* (Schrank, 1776): Somogyszob: Töröktanya, 19. 04. 2012, 1 female, 26. 04. 2012, 7 females, 1 male, 28. 04. 2012, 1 female, Somogyszob: entrance of Bükki-forest, 05. 05. 2012, 1 male, 1 female, Somogyszob: Bükki erdő (Bükki forest), 28. 04. 2012, 2 females, Segesd: edges of Alsó Segesdi forest, 23. 04. 2012, 1 female, 27. 04. 2012, 4 females, 21. 04. 2012, 1 female, 06. 05. 2012, 2 females, 1 male, 10. 05. 2012, 1 female, 05. 05. 2012, 1 female, 28. 04. 2012, 1 female, Segesd: Alsó Segesdi forest, 23. 04. 2012, 1 female, 19. 04. 2012, 1 male, 05. 05. 2012, 1 female, Segesd: Lászlómajor, 28. 04. 2012, 1 female, Somogyszob: Segesdi road, meadow, 05. 05. 2012, 1 female, 23. 04. 2012, 1 female, Szenta: Felső-Gyóta forest, 06. 05, . 2012, 1 female, Berzence: Alsó-Gyóta erdő (Alsó-Gyóta forest), Filagoria: Western side, 26. 05. 2012, 1 female, 20. 05. 2012, 1 female, 19. 05. 2012, 2 females, 10. 05. 2012, 2 females, 06. 05. 2012, 1 male. Common. Hostplants: *Sambucus ebulus, S. nigra, S. racemosa*, *Valeriana officinalis* and *Viburnum opalus*.

Macrophya (*Macrophya*) *annulata* (Geoffroy, 1785): Szenta: Felső-Gyóta forest, 19. 05. 2012, 1 female, Berzence: Alsó-Gyóta forest, Filagoria: Western side, 26. 05. 2012, 1 female, 20. 05. 2012, 1 male, Bolhás: Hókamalom: Fishing pond, 10. 05. 2012, 1 male. Larva on *Potentilla reptans, Origanum vulgare, Euphorbia, Rosa, Rubus* and *Sambucus* spp.

Macrophya (*Macrophya*) *blanda* (Fabricius, 1775): Bolhás: Hókamalom: Fishing pond, 20. 05. 2012, 1 female, 27. 05. 2012, 1 female, 19. 05. 2012, 1 male, Segesd: edges of Alsó Segesdi forest, 05. 05. 2012, 1 male, Vízvár: Komoricai forest, 06. 05. 2012, 1 male, Szenta: Tibor König's grave. 26. 05. 2012, 1 male. Frequent. Hostplant unknown.

Macrophya (*Macrophya*) *duodecimpunctata* (Linné, 1758): Somogyszob: Segesdi road: meadow, 05. 05. 2012, 1 female, Szenta: Felső-Gyóta forest, 20. 05. 2012, 2 females, 10. 05. 2012, 1 female, 11. 05. 2012, 1 female, 26. 05. 2012, 1 female, Kaszó: Kanizsaberek South, 10. 05. 2012, 2 females, Kaszó: Kanizsaberek North, 26. 05. 2012, 1 male, Berzence: Alsó-Gyóta forest: Filagoria Southern part, 05. 05. 2012, 1 male. Common. Hostplants: *Graminae, Cyperaceae* and *Carex* spp.

Macrophya (*Macrophya*) *militaris* (Klug, 1817): Szenta: Felső-Gyóta forest, 26. 05. 2012, 1 female. Sporadic. Hostplant: *Rubus caesius*.

Macrophya (*Macrophya*) *montana* (Scopoli, 1763): Berzence: Alsó-Gyóta forest: Filagoria, Western part, 06. 05. 2012, 1 female, 2 males, 10. 05. 2012, 2 males, 19. 05. 2012, 1 female, 1 male, Berzence: Alsó-Gyóta forest, Filagoria: Southern part, 26. 05. 2012, 1 male, Berzence: Alsó-Gyóta forest, North of Filagoria, 20. 05. 2012, 2 males, edges of Segesd: Alsó Segesdi forest, 10. 05. 2012, 2 females, Szenta: Felső-Gyóta forest, 26. 05. 2012, 1 female, 10. 05. 2012, 1 male, Tarany: Nagy-erdő (Nagy forest), 05. 05. 2012, 1 male, Vése: Csöpröndi road, 27. 05. 2012, 4 females, 2 males, Bolhás: Hókamalom: Fishing pond, 27. 05. 2012, 2 females, 11. 05. 2012, 1 male. Common. Hostplant: *Rubus caesius*.

Macrophya (*Macrophya*) *postica* (Brullé, 1832): Vése: Csöpröndi road, 20. 05. 2012, 1 male. Frequent. Hostplant unknown.

Macrophya (*Macrophya*) *recognata* Zombori, 1979: Bolhás: Hókamalom: Fishing pond, 10. 05. 2012, 2 females, 1 male, 06. 05. 2012, 1 male, 11. 05. 2012, 1 female. Frequent. Hostplant unknown.

Macrophya (*Macrophya*) *ribis* (Schrank, 1781): Bolhás: Hókamalom: Fishing pond, 19. 05. 2012, 1 female, 27. 05. 2012, 1 female. Frequent. Larva on *Sambucus nigra*.

Pachyprotasis rapae (Linné, 1767): Kaszó: Kanizsaberek North, 23. 04. 2012, 1 female, Somogyszob: Segesdi road, 27. 04. 2012, 1 female, Berzence: Alsó-Gyóta forest: Filagoria: Western side, 05. 05. 2012, 1 female, 06. 05. 2012, 1 female, Szenta: Felső-Gyóta forest, 20. 05. 2012, 1 female, 26. 05. 2012, 1 female, 26. 04. 2012, 1 male, 05. 05. 2012, 1 male, 06. 05. 2012, 3 males, 26. 05. 2012, 1 male, Berzence: Alsó-Gyóta forest: Filagoria Southern side, 06. 05. 2012, 1 male, Vízvár: Komoricai forest, 06. 05. 2012, 2 males. Common. Hostplants: *Solanum tuberosum, Pedicularis palustris, Angelica sylvestris, Veronica beccabunga, Betonica officinalis, Corylus avellana, Salix caprea, Fraxinus excelsior, Tussilago farfara, Symphoricarpos albus, Scrophularia, Solidago, Verbascum, Origanum, Atropa, Sarothamnus, Senecio, Polygonum, Aspidium, Epilobium, Hypericum, Galeopsis, Mentha, Polystichum, Plantago, Quercus* and *Stachys* spp.

Perineura rubi (Panzer, 1805): Kaszó: Bükki forest, 15. 04. 2012, 1 male, 21. 04. 2012, 1 male, Kaszó: Kanizsaberek South, 23. 04. 2012, 1 female. Sporadic. Hostplant unknown.

Sciapteryx consobrina (Klug, 1816): Szenta: Felső-Gyóta forest, 26. 04. 2012, 1 female. Generally common but not typical for Belső-Somogy. Larval hosts: *Adoxa* spp., *Anemone* spp. and *Ranunculus ficaria*.

Tenthredo (*Cephaledo*) *bifasciata* ssp. *violacea* (Ed. André, 1881): Berzence: Alsó-Gyóta erdő (Alsó-Gyóta forest), Filagoria: Western side, 10. 05. 2012, 1 female. Frequent. Hostplant unknown.

Tenthredo (*Endotethryx*) *campestris* Linné, 1758: Szenta: Felső-Gyóta forest, 11. 05. 2012, 1 male. Frequent. Hostplant: *Aegopodium podagraria*.

Tenthredo (*Eurogaster*) *mesomela* Linné, 1758: Bolhás: Hókamalom: Fishing pond, 10. 05. 2012, 1 female, Szenta: Felső-Gyóta forest, 10. 05. 2012, 1 male. Frequent. Larval hosts: *Polygonum persicaria, Arctium lappa, Heracleum* spp., *Ranunculus* spp., *Epilobium* spp., *Rumex* spp, *Salix* spp., *Veronica* sp., *Tussilago* spp., *Petasites* sp., *Senecio* sp., *Solidago* sp., and *Stachys* spp.

Tenthredo (*Temuledo*) *temula* Scopoli, 1763: Somogyszob: Segesdi road, 05. 05. 2012, 1 male, Somogyszob: edges of Bükki-forest, 05. 05. 2012, 1 female, Somogyszob: entrance of Bükki-forest, 05. 05. 2012, 5 males, Szenta: Felső-Gyóta forest, 10. 05. 2012, 1 male, Berzence: Alsó-Gyóta forest, Filagoria: Western side, 19. 05. 2012, 1 female. Common. Larva on *Ligustrum* and *Origanum* spp.

Tenthredo (*Tenthredella*) *atra* Linné, 1758: Somogyszob: Segesdi road, 28. 04. 2012, 1 male, Berzence: Alsó-Gyóta forest: Filagoria: Western side, 05. 05. 2012, 1 female, Szenta: Felső-Gyóta forest, 06. 05. 2012, 1 female, 10. 05. 2012, 1 female, Tarany: Nagy-erdő (Nagy forest), South, 10. 05. 2012, 1 female. Frequent. Larval hosts: *Lamium, Mentha, Plantago, Vicia, Ranunculus, Scabiosa, Brassica* and *Solanum* spp.

Tenthredo (*Tenthredella*) *livida* Linné, 1758: Berzence: Alsó-Gyóta erdő (Alsó-Gyóta forest), Filagoria: Western side, 26. 05. 2012, 2 females, 2 males. Sporadic, locally frequent. Larva on *Salix* sp., *Corylus avellana, Epilobium* sp., *Lonicera* sp., *Pteridium aquilinum, Rosa* sp., *Sorbus aucuparia, Symphoricarpos albus, Viburnum opulus, Arctium lappa* and *Athyrium filix-femina*.

Tenthredo (*Tenthredella*) *solitaria* Scopoli, 1763: Somogyszob: Segesdi road, 27. 04. 2012, 1 female, Vése: Csöpröndi road, 26. 05. 2012, 2 males. Sporadic in Hungary. Larva on *Euphorbia cyparissius*.

Tenthredo (*Zonuledo*) *distinguenda* (Stein, 1885): Tarany: Nagy-erdő (Nagy forest), 06. 05. 2012, 1 male, 05. 05. 2012, 1 male, Vése: Csöpröndi road, 27. 05. 2012, 1 female. Sporadic. Hostplant unknown.

Tenthredo (*Zonuledo*) *zonula* Klug, 1817: Tarany: Nagy-erdő (Nagy forest), 06. 05. 2012, 2 females. Frequent. Hostplant: *Hypericum perforatum*.

Tenthredo thompsoni (Curtis, 1839): Iharosberény (ROLLER and HARIS 2008). Frequent. Hostplant unknown.

Tenthredopsis lactiflua (Klug, 1817): Szenta, 15. 05. 1938, 2 females. Sporadic. Hostplant unknown.

Tenthredopsis litterata (Geoffroy, 1785): Somogyszob: edges of the Bükki-forest, 11. 05. 2012, 1 male, Szenta: Felső-Gyóta erdő (Felső-Gyóta forest), 19. 05. 2012, 1 male, Vése: Csöpröndi road, 20. 05. 2012, 1 male. Frequent. Larva on *Agrostis, Dactylis* and *Calamagrostis* spp.

Tenthredopsis ornata (Serville, 1823) (syn. *Tenthredopsis excisa* (C. G. Thomson, 1870)): Kaszó: Kanizsaberek South, 26. 04. 2012, 1 male, Berzence: Alsó-Gyóta forest: Filagoria, Southern side, 06. 05. 2012, 1 male, Szenta: Felső-Gyóta forest, 26. 04. 2012, 1 female. Frequent. Larva on *Brachypodium sylvaticum*.

Tenthredopsis sordida (Klug, 1817): Bolhás: Hókamalom: Fishing pond, 06. 05. 2012, 1 female, Berzence: Alsó-Gyóta forest: Filagoria: Western side, 06. 05. 2012, 1 female,

10. 05. 2012, 1 male, Vése, Csöpröndi road, 27. 04. 2012, 1 male, Somogyszob: meadow at Segesdi road, 28. 04. 2012, 1 male, Szenta: Felső-Gyóta forest, 26. 05. 2012, 1 male. Frequent. Larva on *Arrhenatherum elatius, Lolium perene, Carex* spp., *Calamagrostis* sp. and *Dactylis glomerata*.

Tenthredopsis stigma (Fabricius, 1798): Vése: Csöpröndi road, 26. 05. 2012, 1 female. Generally frequent but not typical for Belső Somogy. Hostplant: *Triticum intermedium*.

Tenthredopsis tessellata (Klug, 1817): Kaszó: Kanizsaberek North, 27. 04. 2012, 1 male, Szenta, 15. 05. 1938, 1 female. Sporadic. Larva on *Deschampsia, Dactylis, Aira* and *Lolium* spp.

Nematinae

Cladius (*Priophorus*) *compressicornis* (Fabricius, 1804) (syn. *Priophorus pallipes* (Serville, 1823)): Kaszó: Kanizsaberek North, 19. 04. 2012, 1 female, Szenta: Felső-Gyóta forest, 26. 05. 2012, 1 male. Frequent pest. Hostplants: *Betula, Cotoneaster, Prunus, Rubus, Sorbus, Fragaria, Crataegus, Corylus* and *Rosa* spp.

Cladius (*Priophorus*) *nubilus* (Konow, 1897): Szenta: Felső-Gyóta forest, 20. 05. 2012, 1 male. New record for the Carpathian Basin.

Euura (*Gemmura*) *mucronata* (Hartig, 1837): Somogyszob: meadow at Segesdi road, 23. 04. 2012, 1 female, 26. 04. 2012, 1 male. Induces galls in the buds of over 30 willow species across the Holarctic region (NYMAN 2002). Sporadic in Hungary.

Hoplocampa chrysorrhoea (Klug, 1816): Kaszó: Kanizsaberek South, 14. 04. 2012, 1 female. Sporadic, locally frequent. Hostplants: *Prunus* spp., particularly *Prunus spinosa* and *P. avium*.

Hoplocampa crataegi (Klug, 1816): Szenta: Felső-Gyóta erdő (Felső-Gyóta forest), 26. 04. 2012, 1 female. Frequent. Hostplants: *Crataegus* spp.

Mesoneura opaca (Fabricius, 1775): Berzence: Alsó-Gyóta forest: Filagoria, Western side, 26. 04. 2012, 1 female. Sporadic. Hostplant: *Quercus robur*.

Nematinus steini Blank, 1998: Kaszó: Kanizsaberek South, 10. 05. 2012, 1 female. Sporadic. Larva on *Alnus* spp.

Nematus (*Pteronidea*) *melanaspis* Hartig, 1840: Szenta, 15. 05. 1938, 1 male. Sporadic. Hostplants: *Populus tremula, Salix aurita, Salix caprea, Salix purpurea, Salix daphnoides, Salix cinerea, Salix fragilis* and *Betula* spp.

Nematus (*Pteronidea*) *myosotidis* (Fabricius, 1804): Berzence: Alsó-Gyóta forest, Filagoria, Western side, 10. 05. 2012, 1 female, Iharos: Alsó-erdő (Alsó forest), 11. 05. 2012, 1 female, Segesd: Lászlómajor, 26. 04. 2012, 1 male, 27. 04. 2012, 1 male. Common. Larval hosts: *Onobrychis* and *Trifolium* spp.

Nematus (*Pteronidea*) *oligospilus* Förster, 1854: Bolhás, end of the village towards the Szenta Forest, 28. 04. 2012, 1 female. Frequent. Hostplants: *Salix* spp.

Nematus (*Pteronidea*) *tibialis* Newman, 1837: Szenta: Felső-Gyóta forest, 06. 05. 2012, 1 female. Frequent. Larva on *Robinia pseudacacia*.

Pachynematus (*Pachynematus*) *fallax* (Serville, 1823) (syn.: *Pachynematus xanthocarpus* (Hartig, 1840)): Vése, Csöpröndi út, 27. 04. 2012, 1 male, Kaszó: Kanizsaberek South, 10. 05. 2012, 1 male. Frequent. Larva on *Graminae*.

Pachynematus (*Pachynematus*) *vagus* (Fabricius, 1781): Kaszó: Bükki forest, 14. 04. 2012, 1 female, 27. 04. 2012, 1 female, Kaszó: Kanizsaberek South, 23. 04. 2012, 1 female, Berzence: Alsó-Gyóta erdő (Alsó-Gyóta forest), Filagoria, Southern side, 26. 05. 2012, 1 female. Sporadic. Larva on *Carex* spp.

Phyllocolpa leucaspis (Tischbein, 1846): Somogyszob: meadow at Segesdi road, 26. 04. 2012, 1 female. Frequent. Larval hosts: *Salix phylicifolia, S. aurita, S. caprea* and *S. cinerea.*

Phyllocolpa leucosticta (Hartig, 1837): Kaszó: Kanizsaberek North, 21. 04. 2012, 1 female. Frequent. *Salix aurita, S. caprea, S. atrocinerea* and *S. cinerea*.

Pontania (*Pontania*) *proxima* (Serville, 1823): Somogyszob: edges of Bükki-forest, 11. 05. 2012, 10 pcs. galls. Frequent, larva on *Salix fragilis* and *S. alba*.

Pristiphora (*Lygaeonematus*) *compressa* (Hartig, 1837): Vése, Csöpröndi út, 27. 04. 2012, 1 female. Sporadic. Larva on *Picea* spp.

Pristiphora (*Lygaeotus*) *pallidiventris* (Fallén, 1808): Kaszó: Kanizsaberek South, 19. 04. 2012, 1 female, 27. 04. 2012, 1 female. Frequent. Larva on *Geum, Potetilla, Rubus* and *Filipendula* spp.

Pristiphora (*Micronematus*) *monogyniae* (Hartig, 1840): Iharos: Alsó-erdő (Alsó forest), 21. 04. 2012, 1 male. Sporadic. Hostplant: *Prunus spinosa* ocasionally *P. domestica*.

Pristiphora (*Oligonematus*) *laricis* (Hartig, 1837): Böhönye (ROLLER and HARIS 2008). Sporadic. Hostplants: *Larix decidua, Larix kaempferi* (*Larix leptolepis*) and *Larix sibirica*.

Pristiphora (*Pristiphora*) *armata* (C. G. Thomson, 1863): Segesd: edges of Alsó Segesdi forest, 06. 05. 2012, 1 females, 5 males, Kaszó: Kanizsaberek South, 20. 05. 2012, 1 female. Frequent. Larva on *Crataegus* spp.

The recorded 130 species makes a good foundation for further research but it is far to assess the real species richness of the region. These collected 130 species represent 22% of the Hungarian sawfly fauna (600 species in total) and 17% of that of the Carpathian Basin (785 species in total).

Eutomostethus ephippium (Panzer, 1798), *Macrophya albicincta* (Schrank, 1776) and *Eutomostethus luteiventris* (Klug, 1816) are the dominant species of the region. Other common species are: *Dolerus nigratus* (O. F. Müller, 1776), *Pachyprotasis rapae* (Linné, 1767), *Aglaostigma fulvipes* (Scopoli, 1763) and *Eriocampa umbratica* (Klug, 1816). *Athalia rosae* (Linné, 1758) is only locally common here.

The 7 rarest species are discussed below.

Rare species

Pamphilius jucundus (Eversmann, 1847): Widely distributed species, known from Austria, Belsium, Bulgaria, Czeh Republic, Germany, Denmark, Estonia, Finnland, Italy, Latvia, Romania, Russia, Slovakia and Ukraine (TAEGER et al., 2006, LISTON 1995). Rare in the Carpathian Basin, knwon from Trencsén, Budapest, Nagykovácsi, Kecskemét, Lillafüred Boksánbánya, Retyezát (MOCSÁRY 1900, ZILAHI KISS 1915, MÓCZÁR and ZOMBORI 1973). Hostplant: *Fragaria vesca* and cultivated strawberries.

Blasticotoma filiceti Klug, 1834: Known from the Carpathin Basin in Körmöci hegység (Körmöci Mountains), Királyhágó, Fenyőfő: Kisszépalma, Uglya: Kvasznij patak, Tiszaborkút (ROLLER and HARIS 2008, ROLLER 2000, ZOMBORI 1973, ZOMBORI and ERMOLENKO 1999). Host ferns are *Athyrium filix-femina, Matteuccia struthiopteris, Dryopteris* spp., *Polystichium* sp., *Pteridium aquilinum* (SCHERBAKOV 2006). Known from Austria, Switzerland, Czeh Republic, Germany, Denmark, Finland, France, Great Britain, The Netherlands, Poland, Russia, Sweden, Slovakia and Ukraine (TAEGER et al., 2006, LISTON 1995, SCHEDL 1973).

Dolerus (*Poodolerus*) *stygius* Förster, 1860 (syn. *D. megapterus* Cameron, 1881) : Widely distributed rare European species. In the Carpathian Basin, it is known from Nickelsdorf, Rábatamási, Dinnyés, Simontornya, Fót, Veresegyháza, Kis Balaton: Zala part, Szigetbecse, Balatonszentgyörgy, Kassa, Peér Felsőtömös, Csalhó Mountains, Horaita and Subcarpathia (HARIS 2002, PODOLEANU 1977, FRANZ 1982, IONESCU 1974,

ERMOLENKO 1975, ROLLER and HARIS 2008).

Cladius (*Priophorus*) *nubilus* (Konow, 1897): First record for the Carpathian Basin. Known distribution: Russia and Czeh Republic. Hostplant unknown. (TAEGER and BLANK 2011)

Stromboceros delicatulus (Fallén, 1808): From the present territory of Hungary was known only from the Mátra Mountains: Pisztrángos tó (Lake Pisztrángos), Cserénfa and Zselickisfalud (HARIS 2009). Widely distributed in the mountaneous area of the Carpathian Basin: Trencsén, Balázsvágás, Limpak, Szentistvánkút, Istvánkirályfalva, Jávori hágó, Deménvölgy, Lukó, Feketevág, Tusnádfürdő, Rétbánya, Sztranszka, Szent Anna-tó, Fekete Tisza, Apsinec, Berlebán, Kvasznij patak, Pop Iván, Alsóláz, Brebenyeszkul, Mencsil, Trebusafejérpatak, Körmöcbánya, Szacsva, Bélai Tátra: Hátsó Rézaknák, Magas Tátra: Hátsó Jávor völgy, Tajó, Kirujfürdő: Tolvajos patak, Zeteváralja: Szencsed patak, Resinár and Uglya (MOCSÁRY 1900, ROLLER 1999a, ROLLER et. al., 2006, ROLLER and HARIS 2008, ZOMBORI 1982, ZOMBORI and ERMELENKO 1999). The specimens were collected on *Athyrium filix-femina*.

Aneugmenus coronatus (Klug, 1818): In the Carpathian Basin, it is known from Herencsvölgy, Balázsvágás, Limpak, Mosóc, Istvánkirályfalva, Kőrishegy Kőszeg, Darány, Resinár, Nagy Égett Kő, Nagyszeben, Magura, Apsinec, Berlebán, Alsóláz, NE Croatia, Székelyfalva, Rahó and Uglya (MOCSÁRY 1900, ROLLER 1993, 1999a, ZOMBORI 1979a, 1982a, ZOMBORI and ERMOLENKO 1999, SCOBIOLA-PALADE 1967, PEROVIC and LEINER 1996).

Heptamelus ochroleucus (Stephens, 1835): First record for Hungary. Recently separated from the closely related *Heptamelus dahlbomi* (Thomson, 1870) (VIKBERG and LISTON 2009). Their hostplants are *Athyrium filix-femina, Blechnum spicant, Dryopteris dilatata, Matteucia struthiopteris* and *Polypodium vulgare*. Known from Belgium, England, Finland, France, Germany, Ireland, Italy, Norway, Poland, Scotland, Sweden, Switzerland and Wales (VIKBERG and LISTON 2009). Also known from the Czeh Republic (Radhost), Slovakia and Ukraine (ROLLER and HARIS 2008). In the Carpathian Basin, we have record from Malacka and Rahó (ROLLER 1996, 1999a).

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Sawflies (Hymenoptera: Symphyta) from Szeged and its surroundings (SE Hungary)

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Gyurkovics, H. & Haris, A.: *Sawflies (Hymenoptera: Symphyta) from Szeged and its surroundings (SE Hungary).*

Abstract: 101 sawfly species are reported from Szeged, Bácsborista and Ásotthalom. *Acantholyda* (*Acantholyda*) *flaviceps* (Retzius, 1783) is new record for Hungary. Rare species are: *Xyela menelaus* Benson, 1960, *Xyela nigroabscondita* Haris and Gyurkovics, 2011, *Tremex alchymista* Mocsáry, 1886, *Arge beckeri* (Tournier, 1889), *Arge frivaldszkyi* (Tischbein, 1852), *Cephus runcator* (Konow, 1896), *Cephus infuscatus* (C. G. Thomson, 1871), *Cephalcia arvensis* Panzer, 1804, *Dolerus quadrinotatus* (Bíró, 1884), *Dolerus stygius* (Forster, 1860), *Athalia rufoscutellata* Mocsáry, 1879, *Macrophya teutona* (Linnaeus, 1767), *Rhogogaster chambersi* (Benson, 1947), *Rhogogaster genistae* (Benson, 1947) and *Pachynematus moerens* Förster, 1854.

Keywords: Hymenoptera, Symphyta, Szeged, Hungary, new record

Introduction

Szeged is situated near the southern border of Hungary, in the Southern Hungarian Great Plain on both banks of the River Theis (River Tisza), 169 km South-East of Budapest. Szeged's climate is transitional between oceanic and continental with cold winters, hot summers, and low precipitation. The yearly mean temperature is 11.2 °C, higher than that of Hungary (10 °C). The yearly mean moisture is only 520 mm. The altitude is at Szeged between 77-80 m and at Ásotthalom 108-116 m above the sea level.

Szeged and its area have been inhabited since the Neolitics (5000 B. Ch.). Ptolemaeus (Ptolemy) mentions the oldest known name of the city: Partiscum. The present name of the city was first mentioned in 1183. For now, it is the 3rd largest city of Hungary with a population of 170 000 people.

The sawfly fauna of Szeged and its environment is hardly known and only a limited number of investigations were carried out in this area. The first checklist of sawflies was published by Vellay (1899). This list contains 37 species, namely *Arge enodis* (Linnaeus, 1767), *Arge ochropus* (Gmelin, 1790), *Abia sericea* (Linnaeus, 1758), *Cimbex femoratus* (Linnaeus, 1758), *Cimbex luteus* (Linnaeus, 1758), *Cimbex quadrimaculatus* (O.F. Müller, 1766), *Acantholyda posticalis pinivora* Enslin, 1918, *Dolerus anticus* (Klug, 1818), *Dolerus gonager* (Fabricius, 1781), *Dolerus haematodes* (Schrank, 1781), *Dolerus niger* (Linnaeus, 1767), *Allantus cinctus* (Linnaeus, 1758), *Allantus didymus* (Klug, 1818), *Athalia glabricollis* C. G. Thomson, 1870, *Athalia rosae* (Linnaeus, 1758),

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Taxonus agrorum (Fallén, 1808), *Blennocampa phyllocolpa* Viitasaari et Vikberg, 1985, *Eutomostethus ephippium* (Panzer, 1798), *Monophadnus pallescens* (Gmelin, 1790), *Macrophya postica* Brullé, 1832, *Macrophya punctumalbum* (Linnaeus, 1767), *Macrophya rufipes* (Linnaeus, 1758), *Rhogogaster viridis* (Linnaeus, 1758), *Sciapteryx costalis* (Fabricius, 1775), *Tenthredo bifasciata* ssp. *rossii* (Panzer, 1804), *Tenthredo costata* (Klug, 1817), *Tenthredo excellens* (Konow, 1886), *Tenthredo flaveola* (Gmelin, 1790), *Cladius pectinicornis* (Geoffroy, 1785), *Nematus bergmanni* Dahlbom, 1835, *Nematus miliaris* (Panzer, 1797), *Nematus myosotidis* (Fabricius, 1804), *Nematus tibialis* Newman, 1837, *Calameuta haemorrhoidalis* (Fabricius, 1781), *Cephus pygmaeus* (Linnaeus, 1767), *Urocerus gigas* (Linnaeus, 1758) and *Xiphydria prolongata* (Geoffroy, 1785) (VELLAY 1899).

His sawfly list was included in MOCSÁRY (1900) and he added the following species: *Pamphilius sylvaticus* (Linnaeus, 1758), *Dolerus blanki* Liston, 1995: Szeged: Fehértó, *Aneugmenus padi* (Linnaeus, 1761), *Selandria serva* (Fabricius, 1793), *Allantus calceatus* (Klug, 1818), *Macrophya albicincta* (Schrank, 1776), *Macrophya chrysura* (Klug, 1817), *Macrophya crassula* (Klug, 1817), *Tenthredo scrophulariae* Linnaeus, 1758, *Tenthredopsis hungarica* (Klug, 1817), *Tenthredopsis lactiflua* (Klug, 1817), *Trichiocampus grandis* (Serville, 1823), *Calameuta filiformis* (Eversmann, 1847), *Xiphydria camelus* (Linnaeus, 1758).

In 1962, Béla Ambrus recorded some Symphyta galls from the area of river Theis (Tisza) at Szeged (AMBRUS 1962), 2 species, namely *Blennocampa phyllocolpa* Viitasaari et Vikberg, 1985 and *Pontania viminalis* (Linnaeus, 1758).

Additional, new sawfly records are available in ROLLER and HARIS (2008): *Pamphilius betulae* (Linnaeus, 1758), *Dolerus nigratus* (O.F. Müller, 1776), *Dolerus puncticollis* C. G. Thomson, 1871, *Athalia cordata* Serville, 1823 and *Stethomosthus funereus* (Klug, 1816).

Finally, 3 more species were recorded by Haris, Nagy, Móczár and Zombori: *Hoplocampa brevis* (Klug, 1816) (Nagy, 1994), *Pikonema pallescens* (Hartig, 1837) (Haris, 2001) and *Sirex juvencus* (Linnaeus, 1758) (MÓCZÁR and ZOMBORI 1973).

Method and material

For identification Zhelochovtsev's work on the sawflies of the European part of the former USSR (ZHELOCHOVTSEV 1988) was consulted, together with the Fauna Hungariae series (MÓCZÁR and ZOMBORI 1973, ZOMBORI 1982, 1990). We also used some recent revisions to make the identifications even more precise (BLANK and RITZAU 1998, HARIS 2006 and KOCH 1988).

For the discussion of the distribution of sawflies, we consulted the book of Roller and Haris titled Sawflies of the Carpathian Basin, History and Current Research (ROLLER and HARIS 2008) and also the most recent European checklist of species (TAEGER et al., 2006). The higher classification of sawflies applied follows the Hymenoptera part of Fauna Europaea (ACTHENBERG 2004). Our references for biological data of sawflies are SCHEDL (1991), TAEGER et. al. 1998, and LISTON 1995.

Localities:

Ásotthalom: a region immediately E of Kiss Ferenc Memorial Woods on both sides of a dirt road, running roughly in a NW – SE direction, with patches of open and closed sand-dune vegetations, surrounded by deciduous and pine wood plantations, between co-ordinates N46°12'56.62", E19°47'38.38" and N46°13'15.81", E19°47'31.27".

Bácsborista, sand dune (homokdomb): a sand dune with relatively steep slopes covered by very spars vegetation. It is surrounded by Scotch pine, black pine, and white poplar plantations. Its co-ordinates are N46°13'43.55", E19°39'17.10"

Bácsborista: pasture (legelő): a sandy pasture-land with a vegetation typical of the Danube – Tisza interfluves, here and there with disturbed spots covered by ruderal vegetation, lying SE of the small Bácsborista settlement. It is surrounded on three sides by plantations of deciduous and pine woods, and by arable lands on its NE side. It stretches in a NW-SE direction between co-ordinates N46°13'50.01", E19°39'46.78" and N46°13' 23.72", E19°40'40.08".

Kelebia: fishing ponds (Kelebiai halastavak): the eastern edge of the northernmost member of a series of artificial fishing ponds near Kelebia. The pond is unused now and is covered by reed, flag, *Carex* and *Cyperus*. Its margin gradually turns into a sandy pasture. Co-ordinates: N46°13'10.83", E19°37'4.23"

Mórahalom, Csipaksemlyék: a shallow depression between low, consolidated sand-dunes, which harbors a drying-out bog with a species-rich vegetation that includes several species of orchids and irises. It is spread around co-ordinates N46°11'2.55", E19°54'3.53"

Szeged, Maros töltés: both sides of the dam on the left bank of river Maros from the confluence with river Tisza to about 2000 m upriver, including the edge of the softwood gallery forest on its north, and the area stretching along it on its southern side, until the stripe of cultivated arable land that follows the course of the dam. The southern slope of the dam is regularly mown and is covered by open grass and some weed, while the northern slope is covered by closed grass that molds into a wetland type of vegetation near the softwood gallery forest. The area stretches between co-ordinates N46°15'2.35", E20°11'27.54" and N46°14'24.42", E20°12'56.68".

Szeged, Öthalom: a hill of loessic silt used traditionally for extracting earth for refilling purposes, now a mosaic of freshly opened and old pits, the deeper parts of which are overgrown with reed or by deciduous woods, while higher grounds are covered by drought-tolerant weeds and grasses. Co-ordinates: N46°17'12.48", E20°6'18.47"

Szeged: Újszeged, Erzsébet liget, (formerly Népliget): it is a city park near the left bank of river Tisza, planted over about 160 years. A broad stripe on both sides of the central walk is under more or less constant gardening, while the remaining parts on either side are mostly undisturbed woodlands. Co-ordinates: N46°14'53.22", E20°9'45.03"

Szeged: Újszeged, the levee at the end-point of Légió utca (= Légió street): a stretch of about 500 m of an old flood bank between co-ordinates N46°12'3.69", E20°9'7.87" and N46°12'43.74", E20°9'32.28". It is covered by closed grass mixed with weeds.

Szeged: Újszeged, railway station (vasútállomás): the environs of the railway station (the final stop of the Makó – Szeged line), roughly between the end-point of Gyimesi street and the UTC Sporting Ground. Most of it is unused land, which was several decades ago a place of a demolished factory, now spontaneously overgrown by sapwoods of mixed deciduous trees, ruderal vegetation and weeds; other parts are planted over by different deciduous tree species. It stretches between co-ordinates N46°14'34.41", E20°9'38.54" and N46°14'17.00", E20°9'33.98"

Szeged: Újszeged, vasúti töltés: the old railway embankment between co-ordinates N46°13'31.91", E20°10'31.22" and N46°13'20.97", E20°10'36.59", covered by grass and weeds with sporadic bushes of *Prunus spinosa*, *Rosa* sp. and *Crataegus* on its western slope, and with a denser cover of these bushes interspersed with planted oak trees on its eastern side.

Szeged, Tisza part: the northernmost tip of the softwood gallery forest covering "Boszorkánysziget" ("Witch's island"), near the city centre. Only a single specimen of *Rhogogaster chlorosoma* was collected here. Its co-ordinates are: N46°14'37.83", E20°8'59.18"

Szeged: Újszeged, "Kamaratöltés" (the levee at the end-point of Légió street): a stretch of about 500 m of an old flood bank between co-ordinates N46°12' 3.69", E20°9' 7.87" and N46°12'43.74", E20°9'32.28". It is covered by closed grass mixed with weeds.

Szeged, Vértói út (Vértói road): a small patch of weedy grass with sporadic Eleagnus bushes on the western side of the Vértói Street at co-ordinates N46°16'36.18", E20°8'13.82"

List of sawflies

Xyelidae

Xyela (*Xyela*) *menelaus* Benson, 1960: Szeged: Újszeged: Népliget, 05-10- 04. 2009, 2 females, 1 male. Locally frequent, mediterranean species. Hostplant: *Pinus nigra* (BLANK 2002).

Xyela (*Xyela*) *curva* Benson, 1938: Szeged: Újszeged: Népliget, 31. 03. 2011, 3 females, 1 male, 14. 04. 2009, 1 male. Locally frequent. Hostplant: *Pinus nigra* (BLANK 2002).

Xyela nigroabscondita Haris and Gyurkovics, 2011: Szeged: Újszeged: Népliget, 14. 03. 2011, 2 females, 15. 03. 2011, 1 female, 1 male. Rare, recently described species, known only from Hungary. Hostplant: *Pinus nigra* (HARIS and GYURKOVICS 2011).

Siricidae

Tremex alchymista Mocsáry, 1886: Ásotthalom, 15. 05. 2011, 1 female. Sporadic with small distribution area. Hostplants: *Quercus, Acer, Betula, Populus* and *Ulmus* spp.

Xyphidriidae

Xiphydria prolongata (Geoffroy, 1785): Szeged: Újszeged, Maros töltés, 26. 06. 2012, 1 female. Sporadic. FFemales live in symbiosis with fungus species, dominantly with *Daldinia childiae*. Hosplants: *Platanus, Populus, Alnus, Acer, Betula, Quercus, Salix, Ulmus* spp. and *Salix caprea*.

Cephidae

Calameuta (*Calameuta*) *filiformis* (Eversmann, 1847): Szeged: Újszeged, Maros töltés, 01. 05. 2012, 1 male, 09. 05. 2012, 1 male, 04. 05. 2012, 1 female, 18. 05. 2012, 1 male, 26. 05. 2012, 1 male, 08. 06. 2012, 2 females, Szeged: Újszeged, railway station, 11. 05. 2012, 1 female, Szeged, Vértói út, 20. 05. 2012, 1 female. Common species. Larva lives in stems of *Arrhenaterum elatius, Phalaris arundinacea, Calamagrostis epigejos, Elytrigia repens* and *Phragmites communis*.

Calameuta (*Calameuta*) *haemorrhoidalis* (Fabricius, 1781): Bácsborista: pasture, 01-05. 05. 2011, 1 female, Mórahalom, Csipaksemlyék, 06. 05. 2012, 1 male, Újszeged, Maros töltés, 01. 05. 2012, 1 male, Szeged: Újszeged, railway station, 11. 05. 2012, 1 female. Frequent species. Hostplant unknown.

Calameuta pallipes (Klug, 1803): Szeged: Újszeged, Maros töltés, 01. 05. 2012, 1 male, Szeged: Újszeged, railway station, 27. 04. 2012, 2 males, 1 female. Frequent species. Hostplants: diverse *Poaceae*.

Calameuta (*Calameuta*) *punctata* (Klug, 1803): Szeged: Újszeged, Légió utca, 08. 04. 2012, 2 males, 7 females, 20. 04. 2012, 1 male, 3 females, Szeged: Újszeged, Maros töltés, 05. 04. 2012, 1 male, Szeged: Újszeged, old railway embankment, 19. 04. 2012, 1 female. Sporadic in Hungary.

Fig. 1: ***Xyela menelaus*** **Benson, 1943**

Fig. 2: ***Tremex alchymista*** **Mocsáry, 1886**

Fig. 3: ***Acantholyda flaviceps*** **(Retzius, 1783)**

Fig. 4: ***Cephus infuscatus*** **(C. G. Thomson, 1871)**

Cephus brachycerus (C. G. Thomson, 1871): Szeged: Újszeged, Maros töltés, 01. 05. 2012, 1 male. Widely distributed, sporadic species. Hostplant unknown.

Cephus infuscatus (C. G. Thomson, 1871): Szeged, Tisza töltés, 04. 06. 2012, 1 male, Szeged: Újszeged, railway station, 04. 06. 2012, 1 female, Szeged, Vértói út, 25. 05. 2012, 1 female. Rare species in the Carpathian Basin, we have only a few records from Hungary, Transylvania and Slovakia.

Cephus nigrinus Thomson, 1871: Szeged, Öthalom, 30. 04. 2012, 1 female, Szeged: Újszeged, Maros töltés, 01. 05. 2012, 1 male, Szeged: Újszeged, old railway embankment, 19. 04. 2012, 1 male. Frequent species. Hostplants: *Milium effusum* and *Poa pratensis*.

Cephus pygmaeus (Linnaeus, 1767): Szeged: Újszeged, railway station, 14. 05. 2011, 1 female, Szeged: Újszeged, Maros töltés, 28. 04. 2012, 1 female, 2 males, Szeged: Újszeged, railway station, 27. 04. 2012, 1 male, 31. 04. 2012, 2 males, 11. 05. 2012, 1 female, Szeged: Újszeged, old railway embankment, 5 females. Common. Insect pest of cereals and *Graminae*.

Cephus runcator (Konow, 1896): Szeged: Újszeged, Maros töltés, 26. 05. 2012, 2 females. Rare. Restricted to Hungary and North-East Croatia in the Carpathian Basin.

Cephus spinipes (Panzer 1800): Szeged: Újszeged, Légió utca, 20. 04. 2012, 1 male, Szeged: Újszeged, Maros töltés, 01. 05. 2012, 1 female, 28. 04. 2012, 1 male, Szeged: Újszeged, railway station, 26. 04. 2012, 1 female, Mórahalom, Csipaksemlyék, 26. 05. 2012, 1 female. Frequent species. Known hostplant: Phleum pratense.

Argidae

Aproceros leucopoda (Takeuchi, 1939): Mórahalom, Csipaksemlyék, 26. 05. 2012, 1 female. Larva on *Ulmus* spp. Recently invaded Europe, known from Hungary, Poland, Slovakia, Austria, Romania, Ukraine and the Russian Far East (BLANK et al. 2010, CSÓKA et al. 2010).

Arge beckeri (Tournier, 1889): Bácsborista, pasture, 20. 05. 2012, 1 female, Mórahalom, Csipaksemlyék, 20. 05. 2012, 1 female. Szeged, Vértói út, 20. 05. 2012, 1 female. Rare species. Larvae found on *Euphorbia* spp.

Arge berberidis (Schrank, 1802): Bácsborista, sand dune, 29. 04. 2012. 1 male, Szeged: Újszeged, old railway embankment, 20. 04. 2012, 1 female. Locally frequent. Larva on *Berberis* and *Mahonia* spp.

Arge cyanocrocea (Förster, 1771): Szeged, Öthalom, 30. 04. 2012, 1 male, Szeged: Újszeged, Maros töltés, 18. 05. 2012, 1 female. Common species. Known hostplants: *Rubus idaeus* and *Sanguisorba officinalis*.

Arge enodis (Linnaeus, 1767): Szeged, Maros töltés, 28. 07. 2011, 1 female, 14. 08. 2011, 1 male. Common. Hostplants: *Salix* spp.

Arge nigripes (Retzius, 1783): Szeged: Újszeged, railway station, 06. 08. 2011, 1 male. Sporadic. Hostplants: *Rosa* spp.

Arge frivaldszkyi (Tischbein, 1852): Bácsborista: pasture, 01-05. 05. 2011, 1 male. Rare. Hostplant unknown.

Arge melanochroa (Gmelin, 1790): Ásotthalom, 25. 07. 2011, 2 females, 1 male, Bácsborista, pasture, 07. 05. 2012, 1 male, 20. 05. 2012, 1 male, 27. 05. 2012, 1 male, Mórahalom, Csipaksemlyék, 30. 05. 2012, 1 female, Szeged, Vértói út, 20. 05. 2012, 1 male. Common species. Hostplant: *Crataegus oxycantha*.

Arge ochropus (Gmelin, 1790): Szeged, Öthalom, 31. 04. 2012, 1 male, 1 female, 30. 04. 2012, 1 female, Szeged: Újszeged, Maros töltés, 01. 05. 2012, 1 female, 06. 05. 2012, 2 females, Szeged: Újszeged, railway station, 16. 07. 2011, 1 female, 02. 08. 2011, 2 females, 06. 08. 2011, 1 male. Pest of *Rosa* spp. Frequent.

Arge pagana pagana (Panzer, 1798): Szeged: Újszeged, railway station, 24. 04. 2011, 1 female. Frequent. Hostplants: *Rosa* spp.

Sterictiphora angelicae (Panzer, 1799): Szeged: Újszeged, railway station, 03. 07. 2011, 2 males, 04. 06. 2012, 1 female, Szeged, Maros töltés, 04. 08. 2011, 1 female, 06.08. 2011, 1 female, 08. 06. 2012, 1 male, Mórahalom, Csipaksemlyék, 12. 05. 2012, 1 female. Frequent species. Hostplant unknown.

Pamphiliidae

Acantholyda (*Acantholyda*) *flaviceps* (Retzius, 1783): Bácsborista, sand dune 10. 04. 2010, 1 female. New record for Hungary. Hostplant: *Pinus* spp.

Acantholyda posticalis (Matsumura, 1912): Bácsborista, sand dune, 15. 04. 2012, 2 male, 3 females, 29. 04. 2012, 1 male. Sporadic in Hungary. Insect pest in forestry. Hostplants: *Pinus* spp. such as *Pimus sylvestris, Pinus nigra, Pinus strobus, Pinus tabulaeformis, Pinus densiflora, Pinus armandi, Pinus thunbergii. Pinus bungeana, Cedrus deodara* and *Platycladus orientalis* are alternative hosts (ZANG 2004).

Neurotoma nemoralis (Linné, 1758): Ásotthalom, 25. 04. 2011, 1 female, Bácsborista, sand dune, 15. 04. 2012, 1 male, 2 females, 29. 04. 2012, 1 female. Known hostplants: *Prunus mahaleb, P. armeniaca, P. spinosa* and *P. cerasus*. Locally frequent pest.

Cephalcia arvensis Panzer, 1804: Bácsborista: pasture, 15-21. 04. 2011, 2 females, 2 males, Szeged: Újszeged, railway station, 15-25. 04. 2011, 1 female. Rare in Hungary. Hostplant: *Picea* spp.

Pamphilius sylvaticus (Linnaeus, 1758): Szeged: Öthalom, 10-15. 04. 2011, 1 male, 31. 04. 2012, 2 females, Szeged: Újszeged, railway station, 23. 04. 2012, 1 female. One of the commonest sawfly species. Hostplants: *Sorbus aucupariae*, *Malus* spp., *Prunus* spp. and *Crataegus* spp.

Megalodontesidae

Megalodontes fabricii (Leach, 1817): Szeged: Öthalom, 10. 06. 2012, 1 female. Sporadic in Hungary. Hostplant unknown.

Cimbicidae

Abia sericea (Linné, 1767): Szeged: Újszeged, railway station, 01. 08. 2011, 1 female, Szeged, Maros töltés, 14. 08. 2011, 1 male, Szeged: Újszeged, Maros töltés, 28. 04. 2012, 1 female. Sporadic. Hostplants: *Succisa, Knautia* and *Fragaria* spp.

Tenthredinidae

Dolerinae

Dolerus (*Achetoprion*) *ferrugatus* (Serville, 1823): Mórahalom, Csipaksemlyék, 15. 04. 2012, 1 male, Szeged: Újszeged, Maros töltés, 04. 05. 2012, 1 female. Sporadic. Larva on *Juncus effusus*.

Dolerus (*Achetoprion*) *triplicatus* (klug, 1818): Kelebia: fishing ponds, 15. 04. 2012, 1 male, 1 female. Sporadic. Larva on *Juncus filiformis* and *Juncus effusus*.

Dolerus (*Dolerus*) *bajulus* (Serville, 1823): Szeged: Maros töltés, 28. 07. 2011, 1 female, 20. 08. 2011, 1 male. Frequent. Hostplants: *Equisetum* spp.

Dolerus (*Dolerus*) *germanicus* (Fabricius, 1775): Mórahalom, Csipaksemlyék, 30. 06. 2012, 1 female. Common. Larva on *Equisetum arvense* and *E. palustre*.

Dolerus (*Poodolerus*) asper Zaddach, 1859: Bácsborista: pasture, 15-21. 04. 2011, 1 female, Szeged: Újszeged, Maros töltés, 05. 04. 2012, 1 female. Sporadic. Hostplants: *Graminae* and *Cyperaceae*.

Dolerus (*Poodolerus*) *gonager* (Fabricius, 1781): Szeged: Újszeged, Maros töltés, 05. 04. 2012, 7 males, 1 female, 06. 04. 2012, 2 males, 5 females, Szeged: Újszeged, railway station, 09. 04. 2012, 6 males, 1 female, 15-25. 04. 2011, 2 females, 13. 04. 2012, 1 male. Common. Larva on *Graminae*.

Dolerus (*Poodolerus*) *haematodes* (Schrank, 1781): Mórahalom, Csipaksemlyék, 25. 03. 2012, 1 male. Periodically common insect pest, otherwise sporadic. Larva on *Graminae*.

Dolerus (*Poodolerus*) *niger* (Linnaeus, 1781): Mórahalom, Csipaksemlyék, 01. 04. 2012, 1 female. Sporadic. Larva on *Graminae*, probably on *Juncus*.

Dolerus (*Poodolerus*) *nigratus* (O. F. Müller, 1776): Bácsborista: pasture, 15-21. 04. 2011, 1 female, Bácsborista: pasture 01-05. 05. 2011, 1 female, Szeged: Újszeged, railway station, 03. 04. 2012, 2 females, 09. 04. 2012, 2 males, Szeged: Újszeged, Légió utca, 19. 04. 2012, 4 males, 2 females, 20. 04. 2012, 3 females, Szeged: Szeged: Újszeged, old railway embankment, 19. 04. 2012, 1 female, 20. 04. 2012, 1 female. Common. Larva on *Graminae* including cereals.

Dolerus (*Poodolerus*) *picipes* (Klug, 1818): Kelebia: fishing ponds, 15. 04. 2012, 2 males, 5 females, 22. 04. 2012, 1 female, Szeged: Újszeged, railway station, 09. 04. 2012, 1 female, 15-25. 04. 2011, 2 females. Frequent. Larva on *Graminae*.

Dolerus (*Poodolerus*) *puncticollis* (C. G. Thomson, 1871): Kelebia: fishing ponds, 15. 04. 2012, 1 female, Szeged: Újszeged, Légió utca, 08. 04. 2012, 6 females, 19. 04. 2012, 1 female, Szeged: Újszeged, Maros töltés, 23. 03. 2012, 3 females, 05. 04. 2012, 1 female, 06. 04. 2012, 1 female, Szeged: Újszeged, railway station, 15-25. 04. 2011, 7 females, 1 male, 03. 04. 2012, 1 female, 11. 04. 2012, 1 female. Common. Larva on *Graminae* including cereals.

Dolerus (*Poodolerus*) *quadrinotatus* (Biró, 1884): Szeged: Újszeged, Légió utca, 08. 04. 2012, 1 female, 19. 04. 2012, 2 females, 20. 04. 2012, 1 female. Rare. Hostplant unknown.

Dolerus (*Poodolerus*) *stygius* (Forster, 1860): Kelebia: fishing ponds, 15. 04. 2012, 1 female. Rare. Hostplant unknown.

Selandriinae

Selandria serva (Fabricius, 1793): Mórahalom, Csipaksemlyék, 12. 05. 2012, 1 female. Frequent. Hostplants: grasses, sedges, rushes.

Allantinae

Allantus (*Emphytus*) *calceatus* (Klug, 1814): Mórahalom, Csipaksemlyék, 26. 05. 2012, 1 male. Frequent. Larva on *Filipendula ulmaria, Fragaria vesca, Rosa canina, Spiraea palmata, Alchemilla vulgaris, Rubus fruticosus* and *Sanguisorba officinalis*.

Allantus (*Emphytus*) *cinctus* (Linnaeus, 1758): Szeged, Maros töltés, 12. 08. 2011, 1 female, Szeged: Újszeged, railway station, 24. 04. 2012. Frequent. Hostplants: *Rosa* spp.

Allantus (*Emphytus*) *cingulatus* (Scopoli, 1763): Ásotthalom, 24. 04. 2011, 1 female, Szeged: Újszeged, railway station, 24. 04. 2012, 2 males, 26. 04. 2012, 1 female. Frequent. Larva on *Fragaria* and *Rosa* spp.

Allantus didimus (Klug, 1818): Szeged: Újszeged, Maros töltés, 04. 05. 2012, 1 male, Szeged: Újszeged, old railway embankment, 19. 04. 2012, 1 male, Szeged: Újszeged, railway station, 11. 05. 2012, 1 female. Frequent. Larva on *Rosa* spp.

Allantus (*Emphytus*) *melanarius* (Klug, 1818): Újszeged, railway station, 01.05. 2012, 1 male. Frequent. Hostplant: *Cornus sanguinea*.

Ametastegia (*Ametastegia*) *glabrata* (Fallén, 1808): Kelebia: fishing ponds, 22. 04. 2012, 1 male, Szeged: Újszeged, Maros töltés, 18. 05. 2012, 1 male, Szeged: Öthalom, 07. 07. 2011, 1 female. Frequent polyphagous species. Hostplants: *Chenopdiaceae, Polygoniaceae, Plantago, Salix, Lythrum, Solanum, Ribes* and *Rubus* spp. Also introduced to South America and Australia.

Athalia ancilla ssp. *ancilla* Serville, 1823 (syn. *Athalia glabricollis* Thomson, 1870): Szeged: Újszeged, Maros töltés, 12. 08. 2012, 1 female. Frequent. Hostplants: *Diplotaxis tenuifolia, Erysimum cheiranthoides, Sinapis alba, Sisymbrium officinale, Raphanus raphanistrum, Brassica nigra* and *Alliaria petiolata*.

Athalia bicolor (Serville, 1823): Mórahalom, Csipaksemlyék, 30. 05. 2012, 1 male, Szeged: Újszeged, Maros töltés, 28. 04. 2012, 2 females, 2 males, 01. 05. 2012, 2 males, 09. 05. 2012, 1 female, 18. 05. 2012. 2 males, 1 female, Szeged, Öthalom, 31. 04. 2012, 2 males, 1 female, Szeged: Újszeged, old railway embankment, 03. 05. 2012, 1 female. Frequent. Hostplant: *Ranunculus* spp.

Athalia cordata (Serville, 1823): Szeged: Újszeged, railway station, 15-25. 04. 2011, 1 female, 23. 04. 2012, 1 male, Szeged: Öthalom, 10-15. 04. 2011, 1 female, 1 male, Szeged: Újszeged, Népliget, 26. 04. 2012, 1 female, Bácsborista: pasture 01-05. 05. 2011, 1 male. Common. Larva on *Misopates orontinum, Antirrhinum majus, Ajuga reptans, Teucrium scorodonia* and *Plantago* spp.

Athalia rosae (Linné, 1758): Szeged: Újszeged, railway station, 24. 04. 2011, 1 male, 2 females, 19. 07. 2011, 1 female, 01. 08. 2011, 1 female, Bácsborista: pasture 01-05. 05. 2011, 1 female, Szeged, Maros töltés, 03. 08. 2011, 1 female, 28. 04. 2012, 1 male, 18. 05. 2012, 1 female, 25. 05. 2012, 1 male, 1 female. Common insect pest. Hostplants: *Raphanus sativus, R. raphanistrum, Sinapis arvensis, Sisymbrium officinale. Armoracia rusticana, Barbarea* sp., *Brassica napus, B. juncea, B. rapa, B. oleracea, Tropaeolum majus, Sinapis arvensis, Alliara petiolata* and *Cardamine* spp.

Athalia rufoscutellata (Mocsáry, 1879): Ásotthalom, 24. 04. 2011, 1 female. Rare in Hungary. Hostplant unknown.

Monostegia abdominalis (Fabricius, 1798): Mórahalom, Csipaksemlyék, 12. 05. 2012, 1 female. Sporadic. Recorded on *Glaux maritima, Lysimachia numularia* and *L. vulgaris*.

Taxonus agrorum (Fallén, 1808): Szeged: Újszeged, Maros töltés, 06. 05. 2012, 1 male. Frequent. Hostplant: *Rubus idaeus*.

Blennocampinae

Blennocampa phyllocolpa Viitasaari & Vikberg, 1985 (= *Blennocampa pusilla* (Klug, 1816)): Szeged: Újszeged, railway station, 15-20. 04. 2011, 1 female, 23. 04. 2012, 4 males, 26. 04. 2012, 2 females, 27. 04. 2012, 1 female, 28. 04. 2012, 2 females. Frequent. Larva rolls the leaves of *Rosa* spp.

Claremontia puncticeps (Konow, 1886): Szeged: Újszeged, railway station, 11. 04. 2012, 1 female. Relatively rare. Hostplant: *Sanguisorba minor*.

Eutomostethus ephippium (Panzer, 1798): Szeged: Újszeged, Maros töltés, 18. 05. 2012, 2 females. Generally common. Larva on *Graminae*.

Eutomostethus gagatinus (Klug, 1814): Szeged: Újszeged, Maros töltés, 09. 05. 2012, 2 males. Sporadic. Hostplant unknown.

Halidamia affinis (Fallén, 1807): Szeged: Újszeged, railway station, 15-20. 04. 2011, 1 female 01. 05. 2012, 2 females. Frequent. Hostplants: *Galium aparine* and *G. molugo*.

Monophadnus spinolae (Klug, 1816): Ásotthalom, 24. 04. 2011, 1 male, Szeged: Újszeged, railway station, 15-20. 04. 2011, 3 males. Sporadic. Hostplants: *Clematis vitalba* and *C. flammula*.

Monophadnoides ruficruris (Brullé, 1832): Szeged: Újszeged, railway station, 09. 04. 2012, 1 male, 11. 04. 2012, 1 male, Szeged: Újszeged, old railway embankment, 19. 04. 2102, 1 female. Sporadic. Hostplant: *Rubus fructicosus*.

Stethomostus fuliginosus (Schrank, 1781): Kelebia: fishing ponds, 22. 04. 2012, 1 male, 1 female, Szeged: Újszeged, Maros töltés, 26. 05. 2012, 1 male. Frequent. Larva on *Ranunculus acris, R. repens* and *R. sceleratus*.

Tomostethus nigritus (Fabricius, 1804): Szeged: Újszeged, railway station, 24. 04. 2011, 1 female. Sporadic. Hostplant: *Fraxinus excelsior*.

Heterarthrinae

Endelomyia aethiops (Gmellin, 1790): Szeged: Újszeged, railway station, 23. 04. 2012, 2 females, 27. 04. 2012, 1 female. Relatively frequent. Larva on Rosa spp.

Tenthredininae

Aglaostigma (*Astochus*) *aucupariae* (Klug, 1817): Szeged: Öthalom, 10-15. 04. 2011, 3 males, 30. 04. 2012, 2 males, Szeged, Újszeged, Maros töltés, 01. 05. 2012, 1 female, Szeged: Újszeged, railway station, 25. 03. - 05. 04. 2011, 3 females, 11. 04. 2012, 1 male, 1 female, 13. 04. 2012, 2 females. Common. Larva on *Galium mollugo* and *G. boreale*.

Macrophya (*Macrophya*) *albicincta* (Schrank, 1776): Szeged: Újszeged, railway station, 06. 04. 2012, 1 male, 24. 04. 2011, 2 females, Szeged: Öthalom, 10-15. 04. 2011, 1 male, 30. 04. 2012, 3 females, Szeged: Újszeged, railway station, 25. 03. - 05. 04. 2011, 1 female, 1 male, Szeged: Újszeged, Népliget, 26. 04. 2012, 1 male. Common. Hostplants: *Sambucus ebulus, S. nigra, S. racemosa, Valeriana officinalis* and *Viburnum opulus*.

Macrophya (*Macrophya*) *doudecimpunctata* (Linnaeus, 1758): Bácsborista, pasture, 07. 05. 2012, 1 female. Frequent. Hostplants: *Graminae, Cyperaceae* and *Carex* spp.

Macrophya (*Macrophya*) *postica* (Brullé, 1832): Szeged: Újszeged, Maros töltés, 04. 05. 2012, 1 male, 06. 05. 2012, 1 female, 09. 05. 2012, 1 male, 2 females, 18. 05. 2012 1 males, 25. 05. 2012, 1 male, 1 female, Szeged: Újszeged, railway station, 04. 06. 2012, 1 male. Frequent. Hostplant unknown.

Macrophya (*Macrophya*) *rufipes* (Linnaeus, 1758):Mórahalom, Csipaksemlyék, 20. 05. 2012, 2 males, Szeged: Újszeged, Maros töltés, 04. 05. 2012, 1 female, 09. 05. 2012, 1 female, 18. 05. 2012, 1 female. Sporadic. Larva on *Agrimonia eupatoria* and *Vitis vinifera*.

Macrophya (*Macrophya*) *teutona* (Linnaeus, 1767): Ásotthalom, 12. 05. 2012, 1 female. Larva on *Euphorbia cyparissias*. Rare in Hungary.

Rhogogaster (*Cytisogaster*) *chambersi* (Benson, 1947): Mórahalom, Csipaksemlyék, 06. 05. 2012, 1 male. Rare in Hungary. Known hostplant: *Linum catharticum*.

Rhogogaster (*Cytisogaster*) *genistae* (Benson, 1947): Mórahalom, Csipaksemlyék, 12. 05. 2012, 1 female. Rare in the Carpathian Basin. Hostplants: *Sarothamnus scoparius, Lembotropis nigricans, Genista tinctoria, Genista germanica*.

Rhogogaster (*Rhogogaster*) *chlorosoma* (Benson, 1943): Szeged, Tisza töltés, 04. 06. 2012, 1 female. Frequent. Hostplants: *Pteridium aquilinum, Alnus glutinosa, Circaea, Prunus* spp., *Ranunculus* spp., *Rosa* spp., *Salix alba, S. purpurea, Stellaria* spp., *Filipendula ulmaria, Populus tremula, Padus* spp., *Betula* spp., *Corylus avellana* and *Sorbus* spp.

Tenthredo (*Cephaledo*) *costata* (Klug, 1817): Bácsborista, 19. 05. 2012, 1 male, 27. 05. 2012, 1 female, 29. 05. 2011, 1 female, Mórahalom, Csipaksemlyék, 12. 05. 2012, 1 male, 30. 05. 2012, 1 female. Sporadic in Hungary, more frequent in the Balkans. Hostplant unknonwn.

Tenthredo (*Elinora*) *bifasciata rossii* (Panzer, 1804): Mórahalom, Csipaksemlyék, 20. 05. 2012, 1 male, 26. 05. 2012, 1 female, Szeged: Újszeged, Maros töltés, 25. 05. 2012, 1 male, 1 female. Frequent. Hostplants: *Scrophularia* and *Verbascum* spp.

Tenthredo (*Elinora*) *dahlii* (Klug, 1817): Szeged, Öthalom, 04. 05. 2012, 1male, Szeged: Újszeged, railway station, 11. 05. 2012, 1 female. Sporadic in the Carpathian Basin.

Tenthredo (*Elinora*) *flaveola* (Gmellin, 1790): Szeged: Újszeged, Maros töltés, 28. 04. 2012, 2 females, 4 males, 06. 05. 2012, 1 male, Szeged: Újszeged, old railway embankment, 03. 05. 2012, 1 male. Sporadic. Larva on *Isatis tinctoria, Brassica nigra, Brassica oleracea, Raphanus raphanistrum, Sinapis alba* and *Sinapis arvensis*.

Tenthredo (*Tenthredella*) *solitaria* (Scopoli, 1763): Mórahalom, Csipaksemlyék, 20. 05. 2012, Szeged, Öthalom, 30. 04. 2012, 1 male, 1 female, 31. 04. 2012, 1 male, 1 female, 04. 05. 2012, 1 male, Szeged: Újszeged, Maros töltés, 28. 04. 2012, 2 females, 06. 05. 2012, 2males, 2 females, 18. 05. 2012, 1 male. Sporadic in Hungary. Larva on *Euphorbia cyparissias*.

Tenthredo (*Zonuledo*) *zonula* (Klug, 1814): Szeged, Öthalom, 30. 04. 2012, 2 females, Szeged: Újszeged, Maros töltés, 06. 05. 2012, 1 female, 18. 05. 2012, 1 male, Szeged: Újszeged, railway station, 14. 05. 2011, 1 female, Szeged: Újszeged, old railway embankment, 19. 04. 2012, 2 females, 03. 05. 2012, 3 males. Frequent. Hostplant: *Hypericum perforatum*.

Tenthredopsis tessellata (Klug, 1817): Ásotthalom, 24. 04. 2011, 1 female, 25. 04. 2011, 1 male, Kelebia: fishing ponds, 15. 04. 2012, 1 male, Szeged, Öthalom, 04. 05. 2012, 1 female, 30. 04, 2012, 1 female, 31. 04. 2012, 1 male, Szeged: Újszeged, old railway embankment, 19. 04. 2012, 1 male, 03. 05. 2012, 1 female. Sporadic. Larva on *Deschampsia, Dactylis, Aira* and *Lolium* spp.

Nematinae

Cladius (*Cladius*) *pectinicornis* (Geoffroy, 1785): Szeged: Újszeged, old railway embankment, 19. 04. 2012, 1 male. Frequent. Larva on *Fragaria, Rosa, Filipendula spp., Poterium sanguisorba, Lamiastrum galeobdolon* and *Comarum palustre*.

Hoplocampa crataegi (Klug, 1816): Ásotthalom, 07. 05. 2011, 1 female. Frequent. Hostplants: *Crataegus* spp.

Hoplocama flava (Linnaeus, 1761): Szeged: Újszeged, railway station, 03. 04. 2012, 1 female. Sporadic pest. Hostplants: *Prunus domestica* and *P. spinosa*.

Hoplocampa fulvicornis (Panzer, 1801): Szeged: Újszeged, railway station, 25. 03. - 05. 04. 2011, 1 male. Sporadic. Larva on *Prunus spinosa*.

Nematus (*Pteronidea*) *tibialis* Newman, 1837: Szeged: Újszeged, railway station, 15-20. 04. 2011, 1 female.1 female, Szeged: Újszeged, railway station, 25. 03. - 05. 04. 2011, 2 females. Frequent. Larva on *Robinia pseudacacia*.

Pachynematus (*Polynematus*) *annulatus* (Gimmerthal, 1834): Szeged, Öthalom, 30. 04. 2012, 1 male, 3 females. Sporadic. Larva on *Rumex obtusifolius*.

Pachynematus clitellatus (Serville, 1823): Szeged: Újszeged, Légió utca, 19. 04. 2012, 1 female. Frequent. Larval hosts: *Poaceae, Carex* and *Juncus* spp.

Pontania (*Pontania*) *proxima* (Serville, 1823): Szeged: Újszeged, Maros töltés, 26. 06. 2012, 7 galls. Frequent, larva on *Salix fragilis* and *S. alba*.

Pachynematus moerens (Förster, 1854): Szeged: Újszeged, Légió utca, 08. 04. 2012, 8 males, 19. 04. 2012, 3 females, 20. 04. 2012, 5 females, Szeged: Újszeged, Maros töltés, 05. 04. 2012, 1 male, 1 female, Szeged: Újszeged, railway station, 11. 04. 2012, 1 female, 15-25. 04. 2011, 1 male. Rare. Larva on *Graminae*.

Fig. 5: ***Cephus runcator*** **(Konow, 1896)**

Fig. 6: ***Arge beckeri*** **(Tournier, 1889)**

Fig. 7: *Dolerus quadrinotatus* (Bíró, 1884)

Pristiphora (*Micronematus*) *monogyniae* (Hartig, 1840): Szeged: Öthalom, 10-15. 04. 2011, 1 male. Sporadic. Hostplant: *Prunus spinosa*, ocasionally *P. domestica*.

Pristiphora (*Pristiphora*) *aphantoneura* (Förster, 1854): Szeged: Maros töltés, 04. 08. 2011, 1 female, 04. 08. 2011, 1 female. Sporadic. Larva on *Salix* spp.

Pristiphora (*Pristiphora*) *bifida* (Hellén, 1948): Szeged: Újszeged, railway station, 25. 06. 2011, 1 female. Sporadic. Larva on *Salix* spp.

Pristiphora (*Pristiphora*) *melanocarpa* (Hartig, 1840): Szeged: Újszeged, railway station, 27. 06. 2010, 1 female. Sporadic. Hostplants: *Salix caprea, Betula pendula, Salix cinerea, Salix fragilis, Salix pentandra* and *Salix viminalis*.

Pristiphora (*Pristiphora*) *pallidiventris* (Fallén, 1808): Tisza töltés, 28. 07. 2011, 1 female. Frequent. Larva on *Geum, Potetilla, Rubus* and *Filipendula* spp.

Pristiphora (*Pristiphora*) *appendiculata* (Hartig, 1837): Szeged: Öthalom, 10-15. 04. 2011, 1 female, Szeged: Újszeged, railway station, 15-20. 04. 2011, 1 female. Common. Hostplants: *Ribes uva-crispa* and *R. rubrum*.

The collected 101 species is a respectable number, especially if we consider that only 99 species were captured from the whole territory of the Hortobágy National Park (ZOMBORI 1981); furthermore, the Hungarian Great Plain (where Szeged and also Hortobágy are situated) holds low number of sawflies. It is very interesting that, in contrast to Hortobágy National Park, rare species constitute a high proportion of the collected material, and even a new species was described from the city (*Xyela nigroabscondita* Haris and Gyurkovics, 2011). The dominant species are: *Dolerus nigratus* (O. F. Müller, 1776), *Dolerus puncticollis* (C. G. Thomson, 1871) and *Athalia rosae* (Linné, 1758). Other common species are: *Arge ochropus* (Gmelin, 1790) and *Macrophya albicincta* (Schrank, 1776). The 16 rare species are discussed below.

Rare species

Xyela menelaus Benson, 1943: (Fig. 1) Known only from Hungary inside the Carpathian Basin: Nagykovácsi, Cinkota (BLANK in VIITASAARI 2002, ROLLER and HARIS 2008). In Cinkota, numerous specimens were captured. We have reliable records from France, Greece, Croatia and Italy only (TAEGER et. al, 2006).

Xyela nigroabscondita Haris and Gyurkovics, 2011: Recently described species, known only from Szeged (HARIS and GYURKOVICS 2011). Probably it has a 2 years obligatory diapause, since it can be collected only in every 2 years. Hostplant: *Pinus nigra*.

Tremex alchymista Mocsáry, 1886: (Fig. 2). The area of this species is very limited. Known from Hungary, Austria and Romania. Known palces from the Carpathian basin: Budapest, Várpalota, Rezi, Budakeszi, Irsa, Törökkopány (MOCSÁRY 1900, ZOMBORI 1973, MÓCZÁR and ZOMBORI 1973, HARIS 1998).

Acantholyda flaviceps (Retzius, 1783): (Fig. 3). New record for Hungary. Known only from a few places of the Carpathian Basin: Tátraszéplak, Szalonca and the Poprádi tó: Menguszfalvi valley from Slovakia (MÓCZÁR and ZOMBORI 1973; Úradník and ROLLER 2000), Nagyenyed Boksánbánya from Transylvania (SZILÁDY 1914, ZILAHI KISS 1915).

Cephalcia arvensis Panzer, 1804: Rare in Hungay, but sporadic in the Carpathian Basin. Places of collection in Hungary: Sopron (MÓCZÁR and ZOMBORI 1973), Csepel (PASCU 1982), Aggtelek (ZOMBORI 1999), Mátraháza (ROLLER and HARIS 2008). Further localities from the Carpathian Basin: Selmecbánya (PETRICSKÓ 1892), Ótátrafüred, Oravicza (MOCSÁRY 1900), Borosznó, Csorba-tó, Dobsina, Felsőhági, Körmöcbánya (ZOMBORI 1967), Blatnica, Nagy-Fátra: Selenecká dol. (SIEKELOVÁ 1980), Balázsvágás, Mosóc, Istvánkirályfalva (ROLLER 1999a), Kecskehát (Úradník and Kulfan, 2002), Szentiván: Jávori-hágó, Fekete Vág, Deménvölgy: Lucski, Királyhegy, (ROLLER et al., 2006), Szalonca, Tátraszéplak, Magas Tátra, Tátralomnic, Újszéplak, Felsőszernye, Oroszlánkő, Bélai Tátra: Hátsó Rézaknák, Magas Tátra: Hátsó Jávor völgy, Kralován: Síp hegy (ROLLER and HARIS 2008), Zilah (ZILAHI KISS 1915), Retyezát, Cibles hg., Hargitafüred, Borberek, Radnai havasok, Gyulafalva, Torja (ZOMBORI 1967), Duruitoare (Ceahlau) (IONESCU 1974), Oravica, Szilágy, Retyezát, Pöltinis, Prejba, Nagyszeben, Bucsecs hg., Todirescu, Moldvahosszúmező, Nagydisznód (SCOBIOLA and ISTRATE 1976, PASCU 1982), Fogaras hgs.: Németmező (ZOMBORI and PASCU 1998), Cibles hg., Radnai havasok, Tartarau, Görgényi havasok, Hargitafüred, Királyfürdő, Retyezát,Torja , Szemenik, Gyulafalva (ZOMBORI 2003), Predeál, Brassópojána (SHINOHARA 1985), Vorohta (OBARSKI 1931), Kárpátalja (BOKOTEY 1961), Ivano-Frankivska region (ERMOLENKO 1966), Mezőhát, Laposmező, Hoverla (ZOMBORI and ERMOLENKO 1999), Tiszabogdány: Brebenyeszkul, Rahó: Alsóláz, Lazescsina, Luhi, Németmokra, Királymező: Latundur hegy (SHINOHARA and ZOMBORI 2003), North-East Croatia (PEROVIC and LEINER 1996).

Cephus infuscatus (C. G. Thomson, 1871): (Fig. 4) Rare species in the Carpathian Basin, we have only few records from Hungary and Slovakia: Csicsó, Malacka, Súr, Pozsony: Dévény, Kopács sziget, Székelyfalva, Ábrahámhegy, Jósvafő, Inárcs (ROLLER 1999a, 2005, ROLLER and HARIS 2008).

Cephus runcator (Konow, 1896): (Fig. 5) Rare. It is restricted to Hungary and North-East Croatia in the Carpathian Basin. Known from Újszentmargita (ZOMBORI 1981), Középrigóc (ZOMBORI 1985b), Bugac (ZOMBORI 1985a), Barbacs, Fehértó, Fertőújlak, Kapuvár, Lébény, Osli, Sopron, Várbalog (ZOMBORI 2002) and Drávadiós (MOCSÁRY 1900).

Arge beckeri (Tournier, 1889): (Fig. 6) Very rare in the Carpathian Basin. Known only from Hungary: 2 males from Kalocsa, June 1887; 2 males from Szin, 11 May 1982, one old male from Érd (early 20th century) and 1 male and 1 female from Ercsi, May 1896

(ROLLER and HARIS 2008). Outside of the Carpathian Basin, it is reported from Italy, Ukraine, Russia, Croatia and Macedonia (TAEGER et. al., 2006).

Arge frivaldszkyi (Tischbein, 1852): Known distribution in the Carpathian Basin: Budapest, Budapest: Gellérthegy, Diósd, Facskói hágó, Garamkövesd, Martonvásár, Párkány, Simontornya, Sukoró, Vértes: Gém-hegy (PÁDR 1990, MOCSÁRY 1900, PILLICH 1930, ROLLER and HARIS 2008, HARIS 2010). It is known from Albania, Macedonia, Bulgaria, Greece, Romania, Slovakia and Ukraine (ACHTERBERG 2004, TAEGER et. al., 2006).

Dolerus (*Poodolerus*) *quadrinotatus* (Bíró, 1884): (Fig. 7) Very rare species, known specimens from the Carpathian Basin: Szöllőske: 7 females, 7 April 1885, Simontornya: 1 female, 25 March 1938, Látrány: 1 female, 14 April 2000, Nagyszeben: 1 female, 21 April 1941 and 1 female, 02. April 1945, Tasnád: 1 female, 14 April 1883 Borosjenő: 1 female, 19th c., Németbogsán: 1 female, 19th century, Battonya: Tompapuszta: Ősgyep: 1 female, 16 April 1998, Sződ: 1 female (early 20th c.) and also knwon from Peér (ROLLER and HARIS 2008, Roller, 1999b). Outside of the Carpathian Basin, it occurs only in Spain (TAEGER et al. 2006).

Dolerus (*Poodolerus*) *stygius* Förster, 1860 (syn. *D. megapterus* Cameron, 1881): Widely distributed, rare European species. From the Carpathian Basin, it is known from Nickelsdorf (FRANZ 1982) Rábatamási (HARIS 2002), Felsőtömös, Csalhó Mountains (IONESCU 1974), Horaita (PODOLEANU 1977), Subcarpathia (ERMOLENKO 1975) Dinnyés, Simontornya, Fót, Veresegyháza, Kis-Balaton, Zala part, Szigetbecse, Balatonszentgyörgy, Kassa and Peér (ROLLER and HARIS 2008).

Athalia rufoscutellata Mocsáry, 1879: In Hungary, this rare species is known from Budapest (MOCSÁRY 1900), Simontornya (PILLICH 1930), Zebegény (MÓCZÁR 1941b), Kőszegi-hgs. (MÓCZÁR 1938), Nagykovácsi (ZOMBORI 1975b), Hárskút, Tihany (ZOMBORI 1979a), Bugac: Nagybugac (ZOMBORI 1985a), Nagyvisnyó (ZOMBORI 1996), Komjáti (ZOMBORI 1999) Kelebia, Jósvafő, Újszentmargita, Máriagyüd, Balatonszéplak: Töreki láp, Nagyvisnyó, Haláp, Komjáti: Alsó hegy, Bátorliget, Bugaci erdő, Nadap (ROLLER and HARIS 2008). Out of our present territory it was captured in Kassa, Pozsony, Pozsony: Dévény Radvány, Óbást: Pogányvár, Kisgömöri, Hubó, Gömör, Kopács-sziget (MÓCZÁR 1941a; JENDEKOVÁ 1988, LUKÁS 1992; ROLLER 1999a, 2005, 2007, ROLLER and HARIS 2008) Nagyszeben: Götzenberg, Koloboca, Brassó: Keresztényhavas, Alman: Medgyes, Prépostfalva, Nagyszeben, Kolibica, Brassó, Tompa, Nagyvárad, Nagyszeben: Götzenberg Pingarati, Beszterce-Naszód, Brassó, Szeben, Görgényi havasok, Nagycsűr: Comana Vlasca, Honctő, Borosjenő, Déva, Betlen (ZOMBORI 1984, IONESCU 1974, ZOMBORI and PASCU 1998, SCOBIOLA-PALADE 1981, STROBL 1901, MOCSÁRY 1900, SCOBIOLA-PALADE 1967, MÜLLER 1920, HARIS and ROLLER 2008), Tökös, Bokroshát (PEROVIC et al., 2006).

Macrophya teutona (Panzer, 1799): Known from: Styria: Weinburg, Trencsén county, Barskisfalud, Csicsó, Pozsonyivánka, Nagyjakabfalva, Pernek, Istvánkirályfalva, Pozsony: Dévény Nat. Res., Kopács sziget, Kőszegi Mts., Nagykovácsi, Gézaháza, Szentgál, Nagyvisnyó, Bongárd, Resicza, Selimbar, Nagyszeben, Subcarpathia, Ómassa, Kóspallag, Simontornya, Nadap, Szalonca. (SCHEDL 1987, BRANCSIK 1893, MOCSÁRY 1900, JENDEKOVÁ 1988, LUKAS 1992, ROLLER 1999a, 2005, 2007, MÓCZÁR 1938, ZOMBORI 1975, 1980, 1996, SCOBIOLA-PALADE 1967, 1978, ERMOLENKO 1960, HARIS 2011).

Pachynematus moerens (Förster, 1854): Widely distributed European species but very rare from the Carpathina Basin. From Hungary, we know this species only from Újszentmargita and Őrszentmiklós (HARIS 2001), we have further data from Koritnyicafürdő (Gregor and Bata, 1942) and from Magas Csuró (Hohe Rinne) at Kereszténysziget in Transylvania (MÜLLER 1920, ROLLER and HARIS 2008).

Rhogogaster (*Cytisogaster*) *chambersi* (Benson, 1947): Records from the Carpathian Basin: Pozsony: Dévény, Szentmiklósvölgye: Pap-kő, Lucski: Királyhegy, Kopács-sziget, Harádics, Bükk: Nagyvölgy, Fehértó, Budapest: Sashegy, Szársomlyó, Párkány, Szacsva (LUKAS 1992, ROLLER and HARIS 2008, ROLLER 2004, 2005, 1999a, 2007, ZOMBORI 1974, 2002)

Rhogogaster (*Cytisogaster*) *genistae* (Benson, 1947): Known from only a few places of the Carpathian Basin: Csicsó, Nagykovácsi, Pécs, Homoródszentpál, Ivó: Ivó-patak and Szászka (ROLLER and HARIS 2008, ROLLER 1996, 1999a, ZOMBORI 1975a).

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New occurrence *Ancylolomia tentaculella* (Hübner, 1796) in Hungary (Lepidoptera: Crambidae)

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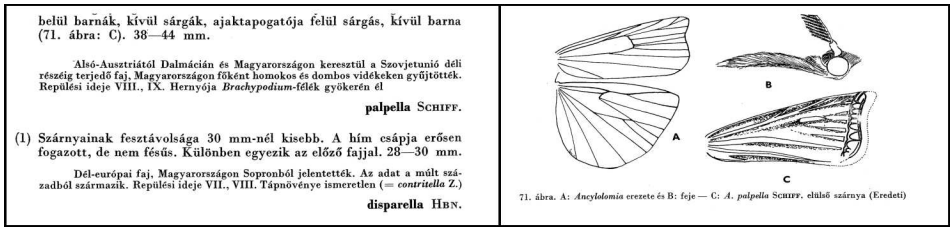
FAZEKAS, I.: *New occurrence Ancylolomia tentaculella (Hübner, 1796) in Hungary (Lepidoptera: Crambidae).*
Abstract: Three species of *Ancylolomia* are recorded from Hungary. Data are reported on the geographical distribution of *Ancylolomia tentaculella* (Hübner, 1796) in Hungary. Biological data and habitats of the species are presented. Distribution is shown on maps. Structure of male genitalia and morphological characteristic of wings are illustrated with colour figures and distributed map. With 5 figures.

Keywords: Lepidoptera, Crambidae, Ancylolomia tentaculella, faunistic, new distribution data, biology, Hungary.

Introduction

The new paper on *Ancylolomia* species in Hungary is the result of about 120 years' work by various Hungarian lepidopterists (ABAFI et al. 1896, SZENT-IVÁNY & UHRIK-MÉSZÁROS 1942, GOZMÁNY 1963, FAZEKAS 1995, 1996, PASTORÁLIS 2011, FAZEKAS et al. 2011). Among the most productive contributors to *Ancylolomia* taxonomy are to be mentioned GOZMÁNY 1963: p. 133–134.) with two species, *A. palpella* Denis & Schiffermüller 1775 and *A. disparella* (Hübner, 1813) (See Fig. 1).

Previously widely used reference books on the Crambidae of Hungary such as GOZMÁNY (1963) lack many species and are no longer compatible with modern nomenclatural and taxonomical standards. There is no top quality identification literature covering the complete fauna of Hungary. Unfortunately there is only scant faunistic data for many Hungarian regions and appropriate long-term observations are mostly wanting.


belül barnák, kívül sárgák, ajaktapogatója felül sárgás, kívül barna (71. ábra: C). 38—44 mm.

Alsó-Ausztriától Dalmácián és Magyarországon keresztül a Szovjetunió déli részéig terjedő faj, Magyarországon főként homokos és dombos vidékeken gyűjtötték. Repülési ideje VIII., IX. Hernyója *Brachypodium*-félék gyökerén él

palpella SCHIFF.

(1) Szárnyainak fesztávolsága 30 mm-nél kisebb. A hím csápja erősen fogazott, de nem fésűs. Különben egyezik az előző fajjal. 28—30 mm.

Dél-európai faj, Magyarországon Sopronból jelentették. Az adat a múlt századból származik. Repülési ideje VII., VIII. Tápnövénye ismeretlen (= *contritella* Z.)

disparella HBN.

71. ábra. A: *Ancylolomia* erezete és B: feje — C: *A. palpella* SCHIFF. elülső szárnya (Eredeti)

Fig. 1. Title page and part of text page from „Fauna Hungariae" (GOZMÁNY 1963)

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Ancylolomia tentaculella was first found in l939 by an anonymous collector near Szeged (Szőreg) and the specimen deposited in the Hungarian Natural History Museum, Budapest. The species was found near a neighbouring city in Hódmezővásárhely twenty-one years later. These specimens are also in the Budapest museum. The specimens were identified mistakenly for *A. palpella*. The antennae and genitalia of *A. tentaculella* differ strikingly from those of the sister species *A. palpella*. Unfortunately, Gozmány did not recognize this and the species were omitted from his book (see GOZMÁNY 1963: p.p. 133–134.).

Although BLESZYŃSKI (1965) mentions this species from "Ungarn", the record was probably based on specimens collected outside present-day Hungary, but this report is surely doubtful (SLAMKA 2010).

A. tentaculella was for the third time found in 2001 and 2005 by Ferenc Buschmann near Nagykáta and Jászberény; besides unexpected new localities in 2011 by Szabolcs Lévai in Mezőtúr (FAZEKAS et al. 2012). From 13 September 1939 to 23 August 2011, various Hungarian lepidopterists collected *A. tentaculella* in five localities as follows.

Material and methods

The moths were sampled using light trap and hand collecting between 1939 and 2011. The collected specimens are preserved in Hungarian Natural History Museum, Budapest. A Breukhoven stereo microscope type BMS (140 Bino Zoom) was used for the investigations of the adult and genital slides were made. The photographs and drawings of the genitalia were made with an Olympus microscope with a drawing tube and BMS digital camera (type: Eyepiece & C-mount camera 3 megapixels). The photographs of the adults were made with a Sony camera type DSC-HX100V. The microscopic investigations and photographs were made by the author.

Ancylolomia tentaculella (Hübner, 1796)

Tinea tentaculella Hübner, 1796; Samml. Eur. Schmett., Tineae: 26: Taf. 33., Fig. 230. Locus typicus: "Italy".

Synonym: *Ancylolomia irakella* Amsel, 1949.

References: Bleszynski 1965, Fazekas et al. 2012, Goater 1986, Slamka 2008.

Fig. 2. Adults of *Ancylolomia tentaculella* (Hübner, 1796): Hódmezővásárhely (to the left), Szeged, Szőreg (to the right)

Diagnosis: Wingspan from 29 to 39 mm. A locally rather variable species. Forewing light ochreous and with a few black scales, with a conspicuous narrow creamy white median longitudinal stripe which is weakly angled towards tornus beyond the cell (Fig. 2). Antennae of male are deeply serrate (Fig. 3). Females are normally larger.

Male genitalia: similar to those of *A. palpella* but apex of uncus hook shaped, gnathos strong, valve with parallel margins, sharply bent upwards about in the centre (Fig. 4).

Female genitalia: bursa copulatrix saccate, VIII tergite half-moon shaped, apophyses posteriors with papillae anales and thus unlike *A. palpella*.

Similar species in Europe: *Ancylolomia palpella* ([Denis & Schiffermüller], 1775), *A. disparalis* (Hübner, [1825]), *A. tripolitella* Rebel, 1909 and *A. pectinatella* (Zeller, 1847).

Biology: The typical habitats are mainly in the salt meadows, open sand steppes with Scots pine (*Pinus sylvestris*) woodlands and saline pasture, edge of agricultural land. The third discovery, an outstanding achievement, was the finding of the meta-population that lives in the Körös branch of a river in the outskirts of Mezőtúr. *A. tentaculella* is very

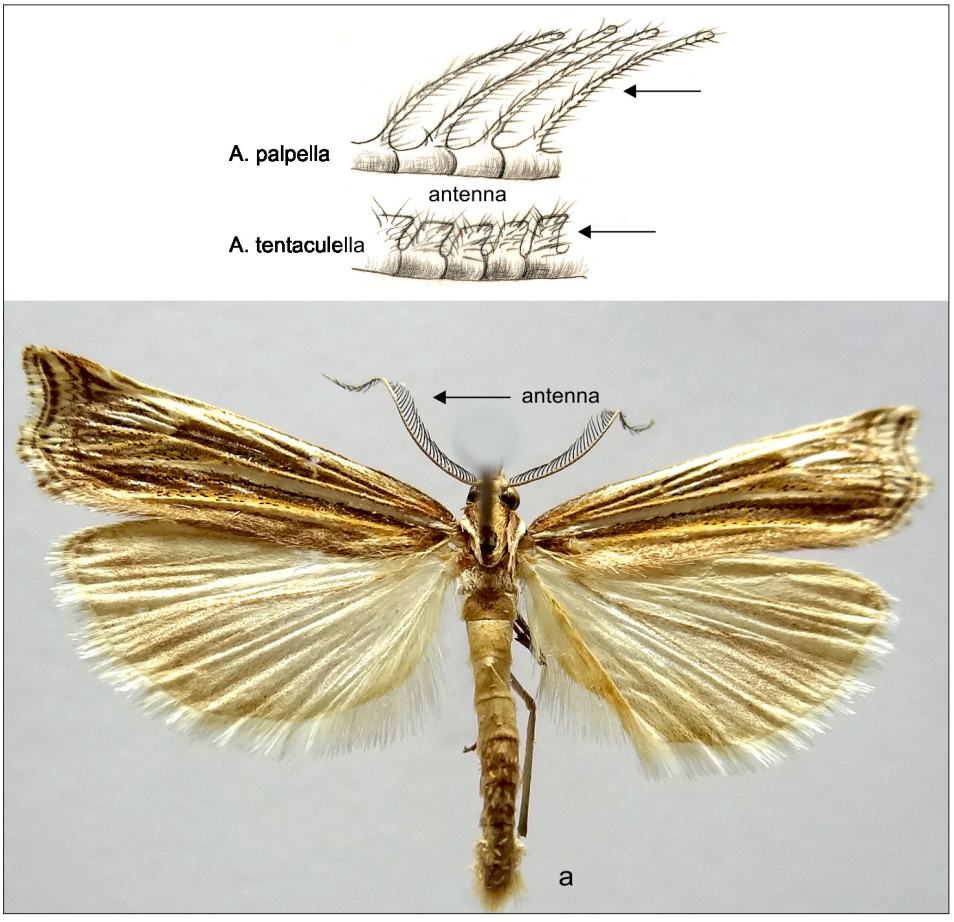

Fig. 3. Male antennal structure of *Ancylolomia palpella* ([Denis & Schiffermüller], 1775) and *Ancylolomia tentaculella* (Hübner, 1796) (upper picture); diagnostic characters of *Ancylolomia palpella* (a)

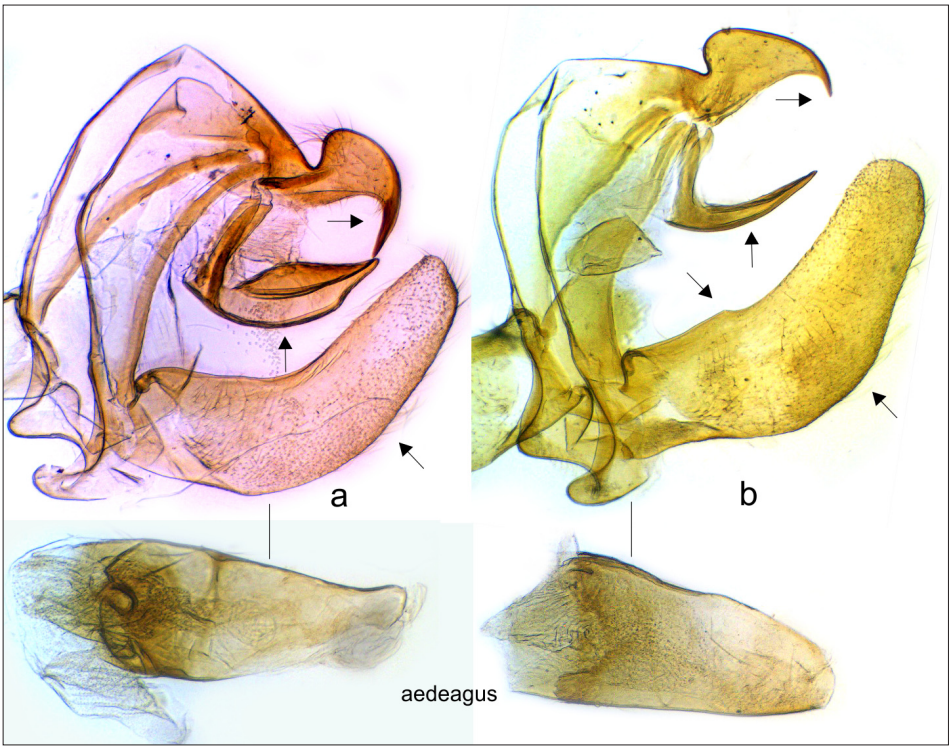

Fig. 4. Male genitalia: a) *Ancylolomia tentaculella* (Hübner, 1796), b) *A. palpella* ([Denis & Schiffermüller], 1775)

local and rare in Central and south-east Hungary. The collected specimens were captured between mid-August and mid-September. According to BLESZYNSKI (1965) the moths fly from July to September and in October in Syria. In England observed in June in July (GOATER 1986). The larva feeds from end September to middle July. Probably oligophagous on *Poaceae*, known food plant that *Dactylis glomerata* L.

According to GOATER (1968) the larva in a vertical tunnel 3–4cm long at the base of stems of large grasses.

Known localities in Hungary (Fig. 5): Published dates (FAZEKAS et al. 2012); ♂, H-Nagykáta, Cseh-domb, UTM DT04, 2001.VIII.19., leg. et coll. Buschmann, F., det. et gen. prep. Fazekas, I. No. 3226; ♂, H-Jászberény, újerdői homokterület [= sand area], UTM DT15, 2005.VIII.27., leg. et coll. Buschmann F., det. Fazekas, I.; ♂, Mezőtúr, Körös, Peresi-holtág, 2011.08.23. leg. et coll. Lévai, Sz.

New localities: ♂, "Coll. Velez, Europa, Hungaria, Szeged, Szőreg, 1939.IX.13. [unknown the collector], ♀ (sic!)" [gen. prep. Fazekas, I. No. 3242]; 1♂, Hódmezővásárhely, 1959.VIII.13., leg. fénycsapda [= light trap]; 2♂, Hódmezővásárhely, 1960.VIII.13., leg. fénycsapda [gen. prep. Fazekas, I. No. 3241]; 1♂, Hódmezővásárhely, 1960.VIII.15., leg. fénycsapda. All specimens deposited in Hungarian Natural History Museum, Budapest.

Distribution: According to recent studies, there are isolated populations in Central Europe only in NW Romania, Central Hungary and Switzerland, usually rare. Widespread and locally frequent (Goater, pers. comm.) in southern Europe from Spain across Italy

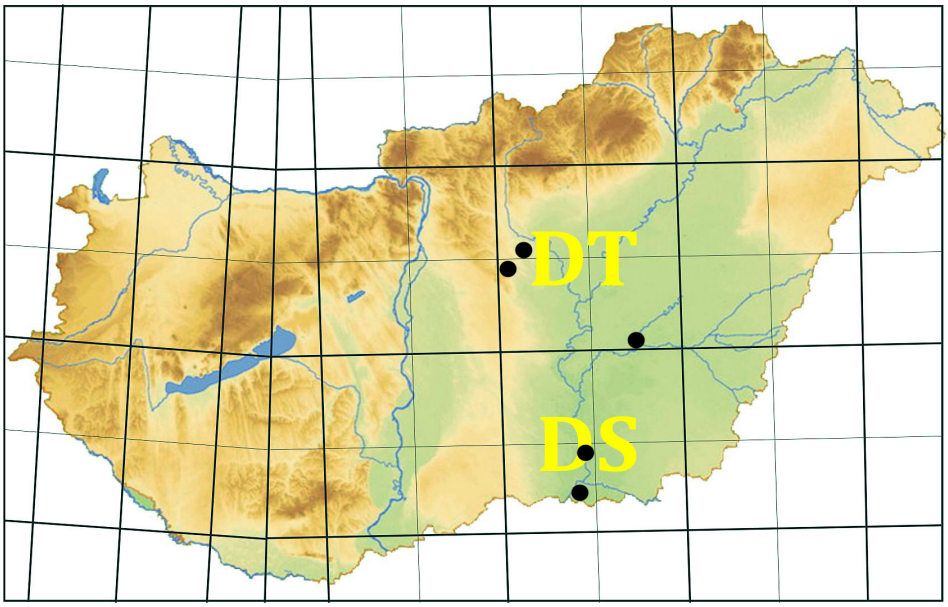

Fig. 5. Known localities of *Ancylolomia tentaculella* (Hübner, 1796) in Hungary

to Balkan Peninsula. Recorded in SE-England (GOATER 1986), though probably an immigrant from southern Europe on each occasion (1935 and 1952). Apart from this, well-known from West Asia to Ural Mountains.

Remarks: In Hungary known only from Great Hungarian Plain but very local and rare; this species is very rarely recorded. Not known from Transdanubian Hills and mountain regions. The flight period of observation is deficient. Early stages unknown in Hungary. Further studies are necessary to verify the relationship between *A. tentaculella* and *A. palpella*.

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The work has been accomplished with the help and advice of many individuals. We wish to express our indebtedness to the Hungarian Natural History Museum (Budapest) and the Head of the Lepidoptera Collections to Zsolt Bálint. Many thanks to the following who have helped in various ways: Ferenc Buschmann (H-Jászberény), Lévai Szabolcs (H-Mezőtúr). Barry Goater (GB-Chandlers Ford) corrected the English language of the manuscript. We are grateful to all for their help.

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Microlepidoptera Pannoniae meridionalis, IX. Data to the knowledge of micro-moths from Dombóvár, No. 2 (SW Hungary) (Lepidoptera)

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Fazekas, I. & Schreurs, A.: *Microlepidoptera Pannoniae meridionalis, IX. Data to the knowledge of micro-moths from Dombóvár, No. 2 (SW Hungary) (Lepidoptera).*
Abstract: 46 species of Microlepidoptera are recorded as new to the fauna of Dombóvár-Gunaras area (SW Hungary). Specimens are deposited in the private collections of A. Schreurs (NL-Kerkade) and in Regiograf Institute (H-Komló). *Bucculatrix humiliella* Herrich-Schäffer, [1855] and *Epermenia falciformis* (Haworth, 1828) is new species in Hungary. *Pelochrista modicana* (Zeller, 1847), *Caloptilia cuculipennella* (Hübner, 1796), *Prays fraxinella* (Bjerkander, 1784), *Blastobasis huemeri* Sinev, 1993, *Ancylis tineana* (Hübner, 1799), *Cydia exquisitana* (Rebel, 1889) and *Ancylosis oblitella* (Zeller, 1848) new to the fauna of the Transdanubian Hills. Biological data and habitats of the species are presented. Distribution is shown on maps. Structure of genitalia and morphological characteristic of wings are illustrated with color figures and distributed map. With 7 figures.

Keywords: Lepidoptera, Microlepidoptera, faunistic, new distribution data, biology, Hungary.

Introduction

This study presents a list of 46 new micro-moths species recorded from the area around Dombóvár–Gunaras. We published our first study in 2010 (Fazekas & Schreurs 2010), and included a list of 436 species of micro-moth recorded from the Dombóvár area. Dombóvár is in SW Hungary, 30 km from Kaposvár (Somogy County) and 50 km from Pécs (Baranya County). Many of the species recorded so far in the Transdanubian Hills are known in only one or two localities, so the new data are useful additions to our knowledge of the distribution of species in Hungary.

The account is based on material collected mainly by Arnold Schreurs (NL-Kerkade) and by Imre Fazekas (H-Komló, Regiograf Institute). The arrangement of the species is based on the classification still followed in Hungarian literature (Fazekas 2002, 2008; Fazekas & Schreurs 2010; Pastorális 2011).

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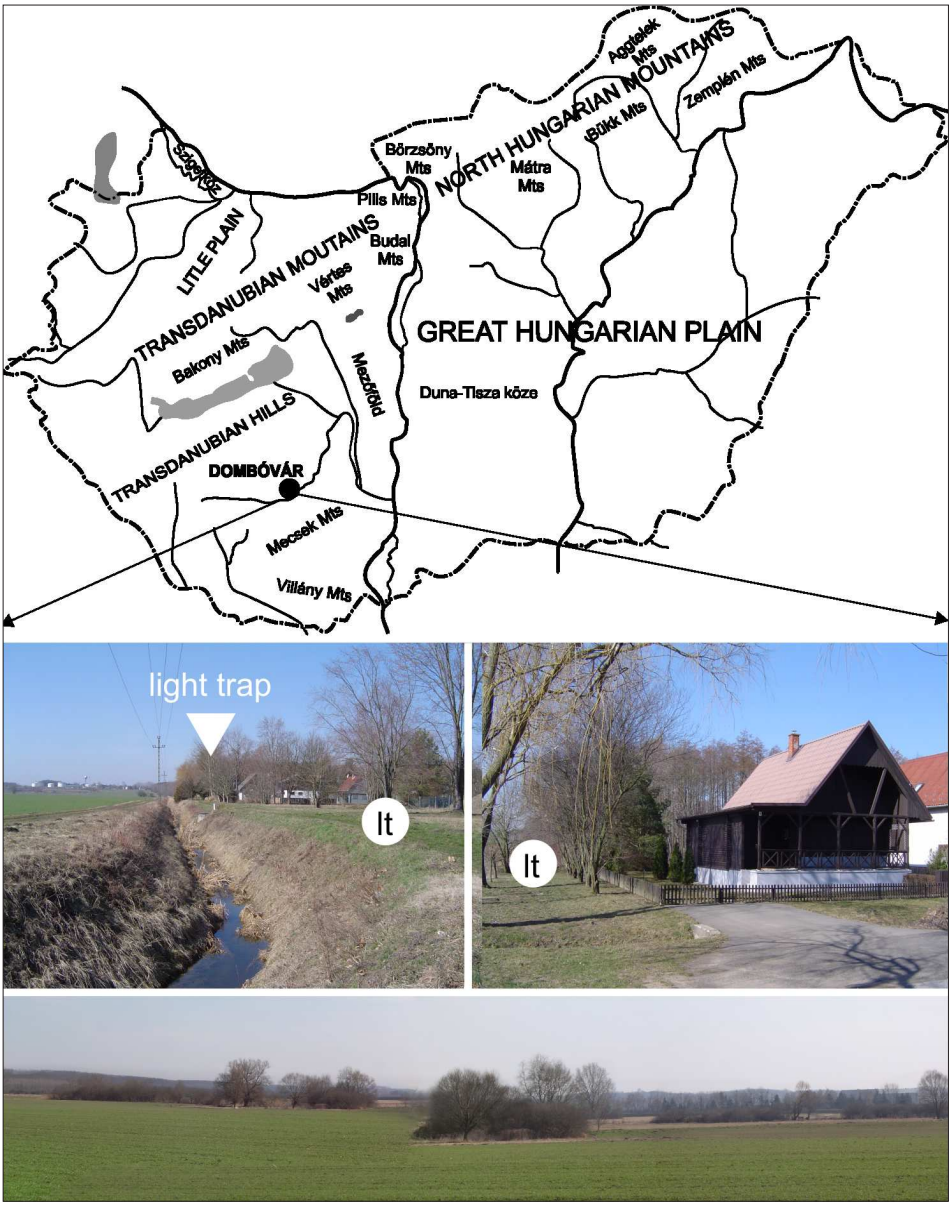

Fig. 1: Study area in Dombóvár, with landscape regions in Hungary (lt= light trap)

Material and Methods

The moths were sampled using light trap and hand collecting. The collected specimens by the second author are preserved in his collection. A Breukhoven stereo microscope type BMS (140 Bino Zoom) was used for the investigations of the adult and genital

slides were made. The photographs and drawings of the genitalia were made with an Olympus microscope with a drawing tube and BMS digital camera (type: Eyepiece & C-mount camera 3 megapixels). Terminology for the morphological structures follows the references. If not stated otherwise, measurements of the forewing include the fringe. The photographs of the adults were made with an Sony camera type DSC-HX100V. The microscopic investigations and photographs were made by Imre Fazekas. Some photos were made by Frans Groenen (e. g. Fig. 4.).

New and confirmed records for the Dombóvár area

(The species are listed alphabetically within the family. Abbreviations in text: HNHM= Hungarian Natural History Museum, Budapest)

NEPTICULIDAE

Stigmella aceris (Frey, 1857) – Material examined: Dombóvár, Gunaras, 20 mines on *Acer campestre*, 26.07.2010 and 06.08.2010; 2 moths ex larva, 14.09.2010. Rare and very local in Transdanubian Hills: Bükkösd, Cserkút, Pécs, Szederkény (FAZEKAS 2002). Widely distributed in Hungary.

TINEIDAE

Cephimallota angusticostella (Zeller, 1839) – Material examined: Dombóvár, Gunaras, 2♂ and 1♀, 5-15.06.2003. The species is known in the Transdanubian Hills in the southern part of the Villány Hills and Somogy county (Kaposvár). Additional localities in Hungary: Aggtelek National Park, Szigetköz area, Vértes Mountains.

Monopis obviella ([Denis & Schiffermüller], 1775) – Material examined: Dombóvár, Gunaras, 1♂, 5-15.06.2003. Sporadically in the Transdanubian Hills: Komló, Pécs, Nagyharsány (Szársomlyó) Barcs (FAZEKAS 2001, 2002). Distribution in Hungary: Aggtelek- and Bükk National Park just as Sikfőkút.

Nemapogon variatella (Clemens, 1859) (= personella Pierce & Metcalfe, 1934) – Material examined: Dombóvár, Gunaras, 2♂, 26.07.2010 and 06.08.2010, gen. prep. Schreurs, No. 1014. Very local in Transdanubian Hills: documented by a single old specimen from in Somogy county (FAZEKAS 2001), but possibly overlooked and therefore careful search is required. Known sporadically in some habitats in the Hungarian mountains at medium altitude: Bakony Mts, Vértes Mts, Budai Mts, Bükk Mts. The moth flies from April to August.

Neurothaumasia ankerella (Mann, 1867) – Material examined: Dombóvár, Gunaras, 1♂, 7-5.08.2000; 1♂, 2-14.07.2004. Not rare in Transdanubian Hills mostly in the Mecsek Mountains (FAZEKAS 2002). Widely distributed throughout rom lowland to of the Hungarian mountains at medium altitude. The moth flies from June to September. Limited information available about habitat preference.

Niditinea fuscella (Linnaeus, 1758) (= *fuscipunctella* Haworth, 1828) – Material examined: Dombóvár, Gunaras, 1♂, 26.07.2010; 1♂, 06.08.2010, gen. prep. Schreurs, No.1017. Disjunct in Transdanubian Hills: one locality in Mecsek Mountains and with locally in Somogy County (FAZEKAS 2001, 2002). Elsewhere frequent in Hungary from May to September; larva on detritus of various kinds.

BUCCULATRICIDAE

Bucculatrix bechsteinella (Bechstein & Scharfenberg, 1805) – Material examined: Dombóvár, Gunaras, 1♂, 5-15.06.2003, gen. prep. Schreurs. No. 1020. A rare species with very isolated populations in the Transdanubian Hills (Kaposvár, Kisvaszar, Komló, Pécs) but widely distributed elsewhere in the country in two generations from end April to August.

Bucculatrix humiliella Herrich-Schäffer, [1855] – Material examined: Dombóvár, Gunaras, 1♀, Hungary, Dombóvár–Gunaras, 10.06.2003., gen. prep. Schreurs, No. 1020; ♀, 06. 08. 2010, leg. et coll. A. Schreurs. UTM: BS84; N 46°24'03", E 18°10'24". This was the first record from Hungary. The species was collected again in 2010 in Gunaras, near Dombóvár (SW Hungary). There are no previous illustrations of the adult and genitalia in Hungary. Typical habitat of the species in Hungary is in arable land with fine soil, often low-intensity agriculture, tree lines and small woods, young afforestation with embedded surviving native grassland vegetation. According to literature, two generations per year have been observed. Adults from the second generation hibernate. Oligophagous, the larva feeds on *Achillea millefolium* and *Tanacetum vulgare*. Distribution: Spain (Granada), France, England, Scotland, Germany, ?Austria, Hungary, Czechia, Slovakia, Poland, Norway, Sweden, Finland, Latvia and Transbaikalia. Not known from the Benelux countries (MEY 2012).

Fig. 2: Adult of *Bucculatrix humiliella* (indicated)

Bucculatrix noltei Petry, 1912 – Material examined: Dombóvár, Gunaras, 1♂, 12-24.07.2004, gen. prep. Schreurs, No. 1019. Records from Somogy county are unconfirmed (FAZEKAS 2001). More important localities in Hungary: Börzsöny Mts, Pilis Mts, Budai Mts, Vértes Mts, Szigetköz area, Mezőföld and "Duna-Tisza köze". The moth flies two generations from June to August. Larva monophagous on *Artemisia vulgaris* from June to July and from September to October (SZŐCS 1977).

GRACILLARIIDAE

Caloptilia cuculipennella (Hübner, 1796) – Material examined: Dombóvár, Gunaras, 1♀, 28.07.- 08.08.2008, gen. prep. Schreurs, No. 1023. The name known in old Hungarian literature: "*Coriscium cuculipennellum* Hb.". Only two localities known in Hungary: Budapest and Aggtelek National Park. New species to the Transdanubian Hills fauna. The moth flies in two generations from June to August. Larva polyphagous on *Jasminum, Ligustrum* and *Syringa* (SZŐCS 1977).

Catoptilia fidella (Reutti, 1853) – Material examined: Dombóvár, Gunaras, 3 moths ex larva, 01.09.2003; 6 mines on *Humulus lupulus*, 26.07.2010 and 06.08.2010. Known from very limited localities in Transdanubian Hills: Kaposvár, Pécs, Simontornya. Local in Hungarian lowland areas from June to August and September. The adults hibernate.

Caloptilia fribergensis (Fritzsche, 1871) – Material examined: Dombóvár, Gunaras, 1♀, 5-15.06.2003; 2♂, 14-28.07.2007; 1♂, 28.07.2008; 1♂, 08.08.2008; 2♂, 1♀, 20.07. 2011; gen. prep. Schreurs, No. 1015, 1016, 1018. Rather infrequent in Hungarian colline and montane areas. Very limited data from Transdanubian Hills: Kisvaszar and Pécs (FAZEKAS 2002).

Catoptilia hemidactylella (Denis & Schiffermüller, 1775) – Material examined: Dombóvár, Gunaras, 3 mines on *Acer campestre*, 26.07.2010 and 06.08.2010; 2 moths ex larva, 12.08.2010. Widespread distributed in Hungary; in two generation from April to October. The moths hibernate. Occurrence in Transdanubian Hills documented by only reared specimens from Kaposvár (SZABÓKY 1983) and Vókány (FAZEKAS 2002).

Calybites quadrisignella (Zeller, 1839) – Material examined: Dombóvár, Gunaras, 4 ex, 5-15.06.2003; 14-16.07.2007; 26.07.2010; 06.08.2010, gen. prep. Schreurs. No. 997. In Transdanubian Hills given only by FAZEKAS (2002) from Mecsek Mountains areas: Pécs and Szederkény. These very old and vague data in the literature have not been confirmed, nor vouchers re-examined (leg. et in coll. I. Balogh; Hungarian Nat. Hist. Mus. Budapest). Sporadic and very rare on the Hungarian hills and uncharacteristically in the mountains of medium height.

Micrurapteryx kollariella (Zeller, 1839) – Material examined: Dombóvár, Gunaras, 1♂, 25-31.08.1998. Sporadic and in few localities from Transdanubian Hills: Kaposvár, Komló, Kővágószöllős, Pécs–Cserkút (FAZEKAS 2002, SZABÓKY 1983).

Parornix petiolella (Frey, 1863) – Material examined: Dombóvár, Gunaras, 1♂,12-23.07.1999, gen. prep. Schreurs, No.1022. Not rare in Transdanubian Hills. Widely distributed in Hungary.

Phyllonorycter issikii (Kumata, 1963) – Material examined: Dombóvár, Gunaras, 25 mine on *Tilia*, 26.07.2010; 6 moths ex larva, 12.08.2010 and 18.08.2010. Species originating from Japan, Korea and Asiatic Russia. Adventives species which appeared on Hungary in 2002 (SZABÓKY 2002); it reached northern areas in 2003, and within a year was already very widely distributed in SW Hungary.

YPONOMEUTIDAE

Paraswammerdamia albicapitella (Scharfenberg, 1805) – Material examined: Dombóvár, Gunaras, 4 ex, 26.07.2010; 06.08.2010. – European species, widely distributed in Hungary, frequent in lowland areas (BUSCHMANN, FAZEKAS & PASTORÁLIS 2011). Bivoltine, flight from April to end June and in August. Footplants: *Prunus spinosa* and *Crataegus* spp.

PRAYDIDAE

Prays fraxinella (Bjerkander, 1784) – Material examined: Dombóvár, Gunaras, 1 ex, 28.07. – 08.08.2008. New species to the Transdanubian Hills fauna. Local and rare in Hungarian mountainous areas: in the Aggtelek, Bükk, Mátra and Vértes Mts. Known from a few specimens from the Jászság and Szigetköz (at Győr), but one of the subdominants in the alder woods at Ócsa (Kiskunság National Park), also the unicolorus form occurs not infrequently. According to ÁCS and SZABÓKY (1993) a characteristic species of *Alnus* woods and *Fraxinus* trees. Remarks: A record of the species at Győr (NW Hungary) published by HORVÁTH (1993) is unconfirmed.

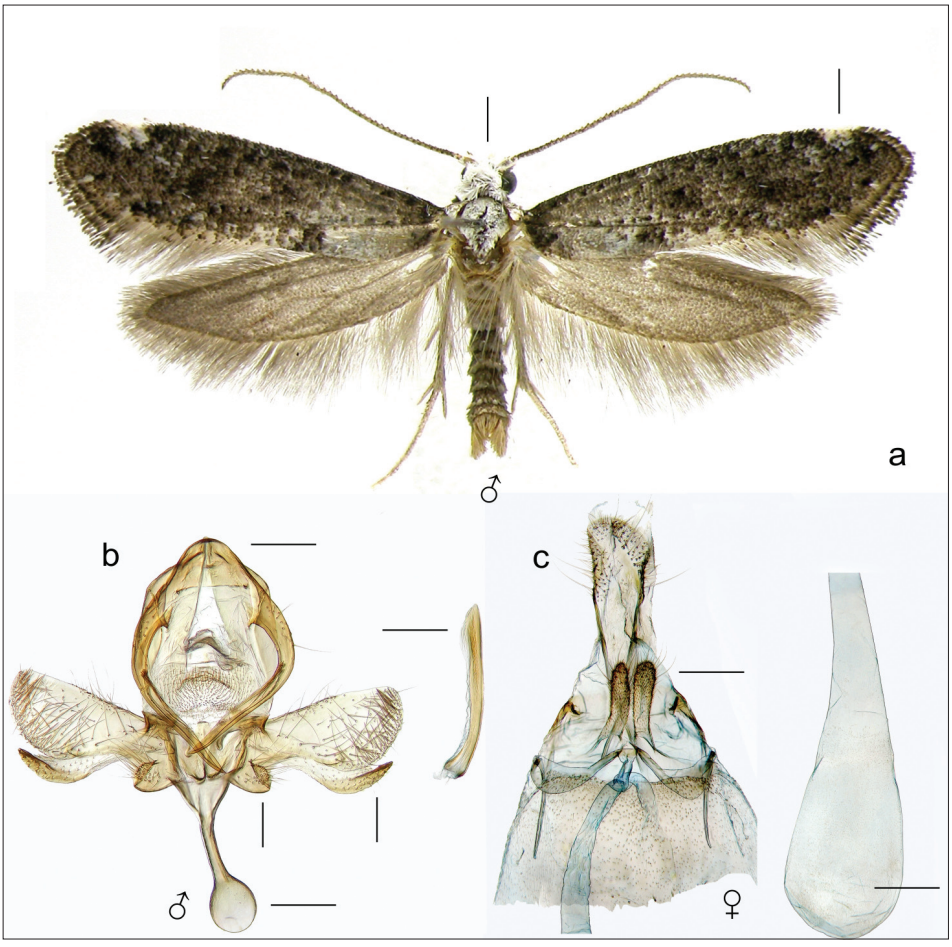

Fig. 3: *Paraswammerdamia albicapitella*: a) adult, b) male genitalia, c) female genitalia (indicated)

BLASTOBASIDAE

Blastobasis huemeri Sinev, 1993 – Examined material: Dombóvár, Gunaras, 1♂, 02.09.2003, gen. prep. A. Schreurs, No.1074; 1♀, 19.07.2004; 1♂, 15.07.2007; 1♂, 26.07.2010, gen. prep. A. Schreurs, No.1075; 1♂, 01.08.2010; 2♂ and 3♀, 20.07.2011. In coll. A. Schreurs. UTM: BS84; N 46°24'03", E 18°10'24". The species was collected again in 2003 in Gunaras, near Dombóvár (SW Hungary). This is the first record from Transdanubian Hills. *Blastobasis huemeri* was described from Croatia (locus typicus: Insel Krk, Punat) and northern Italy (SINEV 2003). The species was later found in Hungary (PASTORALIS & al. 2000).The first known record from Hungary is from Csákberény (Bucka-hegy): Vértes Mountains 31.07.1999, leg. et coll. Ivan Richter (SK-Prievidza), det. and gen. prep. Zdenko Tokár, No.5543. It is found very locally and sporadically in Hungary: Bakony Mts, Vértes Mts and Mátra Mts, from 200 m up to 400 m above sea level. Based on present information, *B. huemeri* has not been collected on the Great Hungarian Plain.

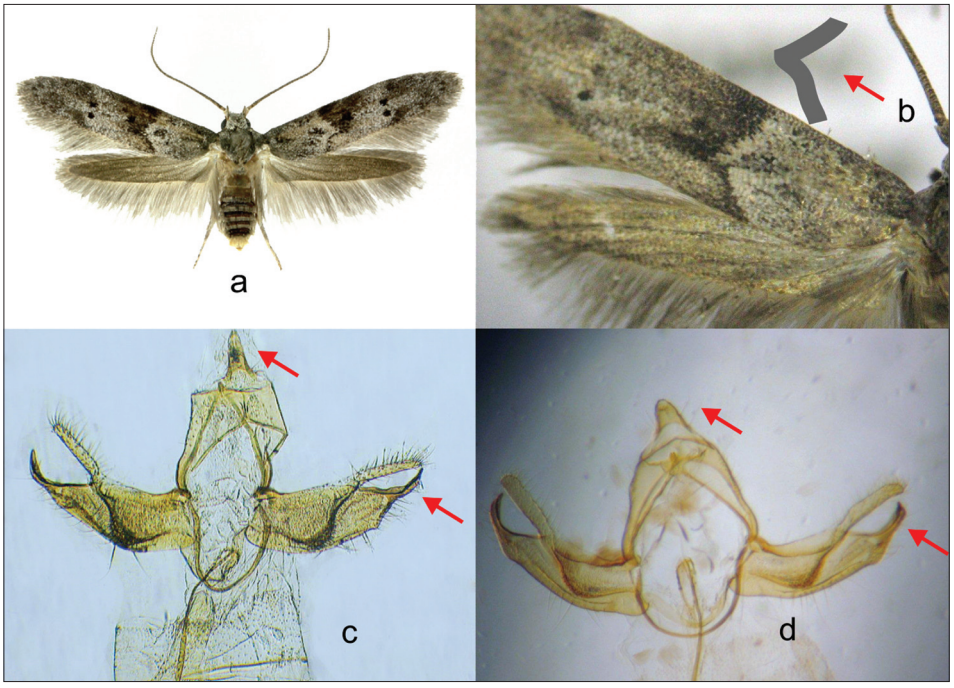

Fig. 4: *Blastobasis huemeri*: a) adult, b) forewing pattern, c) male genitalia from Bohemia, d) male genitalia from Dombóvár–Gunaras

In Hungary, populations of *B. huemeri* occupy mostly xerothermic and sun-exposed habitats in hilly regions, where it is often very rare. Present knowledge suggests that *B. huemeri* occurs only on the European continent: Austria, Chechia, Croatia, France, Germany (sand region), Hungary, Italian mainland, Slovenia and Slovakia (Lepiforum e. V. 2012; LESAR & GOVEDIČ 2010; PERREETTE & SPILL 2008; SINEV 2012). Recent investigation has indicated a northerly extension of its range from southern Europe into central Europe.

The developmental stages, host plants and bionomics of *B. huemeri* are apparently unknown. A German website (Lepiforum e. V. 2012) gave illustrations of the larva and pupa. Moths have been collected from May to August (limited data available). Probably univoltine. According to Gábor Pastorális (pers. comm.), the female wingspan is rather variable. Adults strongly attracted to light.

Remarks: Further study is needed to clarify the localities of the populations of *B. huemeri* in Hungary. Similar species: *Blastobasis phycidella* (Zeller, 1847) and *B. roscidella* (Zeller, 1847). Position of Hungarian range within this species group of blastobasids is uncertain.

ELACHISTIDAE

Elechista serricornis Stainton, 1854 – Material examined: Dombóvár, Gunaras, 1♀, 28.07.2010, leg. et gen. prep. Schreurs, No. 1062. Identification confirmed by J. Liška (CZ-Praha), L. Kaila (FI-Helsinki). Occurrence of *Elechista serricornis* is documented by a single specimen from the Kaposvár in southwest Hungary, collected in 1923 (SZŐCS 1973): "63. *E. serricornis* Stt.: Kaposvár 1923.VII.2. PAZSICKY". From the first Hungarian locality (Kaposvár) to the east, approximately 31 km, the species was found

again in 2010. It is found from Fennoscandia and northern Russia to northern Italy and from Ireland to Poland and Hungary. According to literature the larva feeds on *Carex elata, Carex ericetorum, Carex ferruginea, Carex sylvatica, Carex vesicaria, Eriophorum angustifolium, Eriophorum latifolium, Eriophorum vaginatum* and *Scirpus sylvaticus*. Young larvae make a long, brown corridor, and hibernate in this. In spring, the larva makes a new mine in another leaf, starting near the base of the blade. The mine widens upwards and forms an blotch at the end. Pupation takes place outside the mine.

OECOPHORIDAE

Batia internella Jäckh, 1972 – Material examined: Dombóvár, Gunaras, 1♂,13-23.06.2006, gen. prep. Schreurs, No.1028. The species is rather frequent in Hungary, but very local and rare in Transdanubian Hills (Kaposvár: VI-VII.); furthermore, it is unknown in Mecsek Mountains and Villány Hills.

Batia lambdella (Donovan, 1793) – Material examined: Dombóvár, Gunaras, 1♂, 12-23.07.1999; 1♂, 14-28.07.2007. Widely distributed in Hungary, sporadically in Transdanubian Hills (e. g. Mecsek Mts, Villány Hills).

Borkhausenia minutella (Linnaeus, 1758) – Material examined: Dombóvár, Gunaras, 2 ex, 26.07.2008 and 08.08.2008. Only known localities in Hungary.

GELECHIIDAE

Anarsia lineatella Zeller, 1839 – Material examined: Dombóvár, Gunaras, 1♂, 05-15.06.2003, gen. prep. Schreurs, No. 910. Known from a few specimens in Transdanubian Hills: Mecsek Mountains, Villány Hills and near Kaposvár. A notorious pest of apricots in Hungary.

Bryotropha affinis (Haworth, 1828) – Material examined: Dombóvár, Gunaras, 1♂, 26.07, - 08.08.2008, gen. prep. Schreurs, No. 1027. According to GOZMÁNY and SZABÓKY (1986) the species is characteristic of the sandy plains in Hungary, but this is very disputable. It is ubiquitous, found in colline hay meadows, dry and semi-dry closed grasslands, semi natural, often secondary woodland-grassland mosaics. Altitude from 90 m to 300 m. Very local and rare in Transdanubian Hills: Kaposvár, from end May to early August. Distribution in Hungary: Ágasegyháza, Fülöpháza, Izsák, Orgovány, Kecskemét, Keszthely, Kaposvár, Dombóvár-Gunaras.

Monochroa divisella (Douglas, 1850) (= *lepidolampra* Gozmány, 1952) – Material examined: Dombóvár, Gunaras, 1♂, 5-15.06.2003, leg. Wolschijn, gen. prep. Schreurs. No. 977, det. O. Karsholt. Distribution in Hungary: Ócsa, Izsák, near Velencei-tó [tó= lake], Pécsely (Bakony Mts.), Kis-Balaton, Fonyód, Barcs ["Old"] Juniper Woodland, Dombóvár-Gunaras. Remarks: The Barcs ["Old"] Juniper Woodlands between Barcs and Darány is a nature conservation area of special interest in the Transdanubian Hills; it is an arenaceous region, poor in chalk, with woods and several marshy or boggy depressions.

Scrobipalpa ocellatella (Boyd, 1858) – Material examined: Dombóvár, Gunaras, 1♀, 1-15. 08. 1997; 2♂,1-10. 09. 2002; 1♀,1-12.09.2003., gen. prep. Schreurs. No. 931, 932, 1001, 1002. A widely distributed species in Hungary but has never been collected in such large numbers as in this region.

PTEROPHORIDAE

Stenoptilia zophodactyla (Duponchel, 1840) – Material examined: Dombóvár, Gunaras, 1 ex, 7-15.08.2000; 1 ex, 1-10.09.2002, det. C. Gielis; 1♂, 06.08.2011 [trampled swards], leg. et det. I. Fazekas). Known only from eight diverse localities in Hungary (FAZEKAS 2006): Sárkeresztúr, Bátorliget, Kárász, Komló, Budapest, Doba,

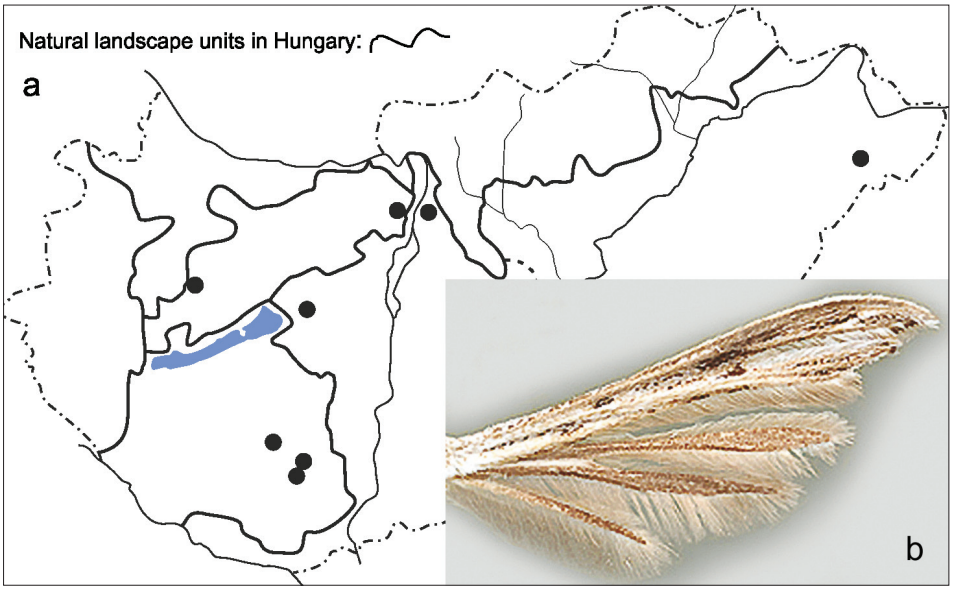

Fig. 5: Known distribution of *Stenoptilia zophodactyla* in Hungary (a), with forewing pattern of adult (b)

Fót, but available data are very limited. Known from the warmer zone in the Hungarian region. According to FAZEKAS (2006) "Eriökes Taxon. In Ungarn es in feucten Wiesen, in Sumpfgebieten, entlagen der Hügellandschaftsflüsse, am Rande von Eichenwald-Lichtungen, in Felsenrasen-Steppen und Sodaboden-gebieten vor." In Hungary the species occurs altitude from 90 m to 350 m. The moth flies in Hungary from April to October in two generations. Polyphagous, recorded foodplants are in the following families: *Asteraceae, Gentianaceae, Orobanchaceae* and *Plantaginaceae* (MATTHEWS & LOTT 2005). In Hungary, the larva has been recorded on *Centaurium erytraea* Rafn., *C. littorale* Roth. and *Brachypodium* spp.. The moth is known from Palaearctic, South Africa, DR Congo, as well as from the Nearctic and Neotropical regions and Australia.

EPERMENIIDAE

Epermenia falciformis (Haworth, 1828) – Examined material: Dombóvár, Gunaras, 1♀, 10.06.2003, gen. prep. Schreurs, A. No.1071; 1♀, 11.06.2003, gen. prep. Schreurs, A. No.1078. In coll. A. Schreurs. UTM: BS84; N 46°24'03", E 18°10'24". This is the first record from Hungary. The species was collected again in 2003 in Gunaras, near Dombóvár (SW Hungary). The wingspan is 9–14 mm. *Epermenia falciformis* is treated as a species separate from *E. illigerella*, with which it has previously been synonymised. According to literature, the larvae feed on *Angelica sylvestris* and also *Aegopodium podagraria*, but this record probably refers to *E. illigerella*. Bred specimens should be re-examined.

The adult moths are on the wing in two generations, from May to July and again in August and September. Larvae of the second generation live in the umbels of the same plants. Pupation takes place in an open network cocoon amongst detritus on the ground (see http://www.ask.com/wiki/Epermenia_falciformis).

Distribution in Palaearctic: The species was re-established as valid by SCHOLZ (1996), having been previously regarded as a synonym of *E. illigerella*. Since this time recorded

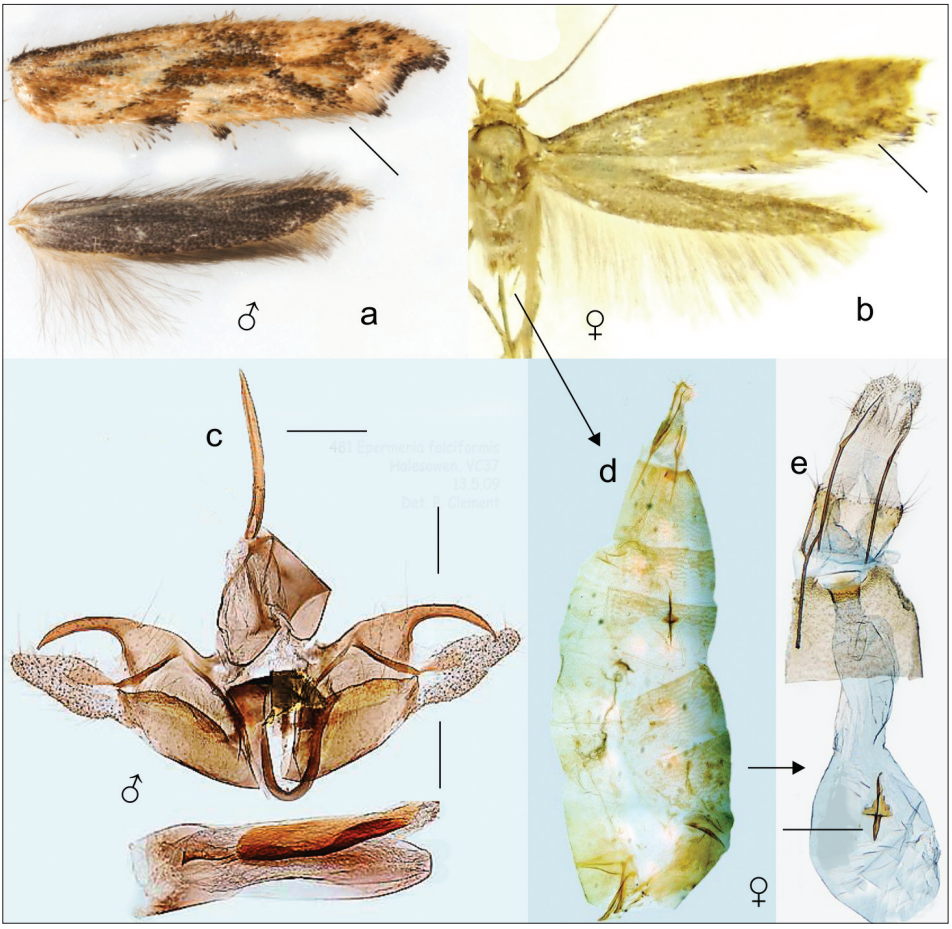

Fig. 6: Diagnostic characters (indicated) of *Epermenia falciformis*: a) wing pattern, b) specimen from Dombóvár–Gunaras, c) male genitalia, d) abdomen, e) female genitalia

only from British Isles, some parts of Middle and North Europe; outside Europe from Russia; Ural Mountains, Irkutsk and East Ussurijsk areas (BUDASHKIN & GAEDIKE 2005).

Range in Europe: Austria, Belgium, British Isles, Czechia, Denmark, Finland, Germany, Hungary (new record), Latvia, Slovakia, Sweden (GAEDIKE 2012). According to SCHOLZ (1996): "Schweiz" and "Holland".

Remarks: The family Epermeniidae contains nearly 100 described species in eight genera, and is known from all faunal regions. Data on taxonomy, distribution, and biology were compiled by GAEDIKE (1979, 1996a). According to BUDASHKIN and GAEDIKE (2005) the life histories indicate that the larvae live in mines in leaves, or that they skeletonise leaves or feed on seeds, mainly of *Apiaceae*. There are a few host records in other plant families: *Araliaceae, Celastraceae, Epacridaceae, Fabaceae, Loranthaceae, Oleaceae, Pittosporaceae* and *Santalaceae*.

TORTRICIDAE

Acleris rhombana ([Denis & Schiffermüller], 1775) – Material examined: Dombóvár, Gunaras, 1♂, 7-15.08.2000, gen. prep. Schreurs. No. 888. This species is known only in a few localities in Transdanubian Hills (FAZEKAS 2002: Mecsek Mts, Villány Hills). *Distribution in Hungary*: North Hungarian Mountains, Transdanubian Mountains (local and rare), Little Plain (Szigetköz), Great Hungarian Plain; frequent at Peszér, but only a single specimen captured at Bugac (see GOZMÁNY & SZABÓKY 1986). Know from North Iran to Scandinavia, British Isles and Iberian Peninsula. Introduced to North America.

Ancylis tineana (Hübner, 1799) – Material examined: Dombóvár, Gunaras, 2♂, 26.07.2010; 06.08.2010. New species for the fauna of the Transdanubian Hills. Local in Hungary: North Hungarian Mountains, Transdanubian Mountains, Little Plain (Szigetköz) and Great Hungarian Plain (Jászfelsőszentgyörgy, Nagykáta). Widely distributed in Palaearctic and Nearctic regions. Polyphagous species on *Betula, Crataegus, Malus, Populus, Prunus, Pyrus* etc.; sometimes a pest in orchards.

Ancylis unculana (Haworth, [1811]) – Material examined: Dombóvár, Gunaras, 3 ex, 26.07. – 06.08.2010. Found very sporadically in Transdanubian Hills: near Kaposvár, Mecsek Mountains and Villány Hills. Characteristically mountainous species in Hungary but very local in lowlands (e. g. Jászság area). Not recorded from eastern Hungary. Widely distributed from Japan to Europe.

Cochylidia heydeniana (Herrich-Schäffer, 1851) – Material examined: Dombóvár, Gunaras, 1♂, 1-15.08.1997, det. F. Groenen, gen. prep. No 0876. Localities in Hungary: Budapest, "Kiscell", Kárász, Kecskemét, Vörs, (FAZEKAS 1992, 1994). Very little is known of the habitat preference in Hungary. Typical habitat in Mecsek Mountains (Kárász): riversides in hills or middle mountains with riparian alder or willow woods.

Cochylis epilinana Duponchel, 1842 – Material examined: Dombóvár, Gunaras, 2 ex, 14-28.08.2009; 4 ex, 26.07. – 06.08.2010, det. F. Groenen. The species is known only in a few localities from Transdanubian Hills: Kaposvár, Pécs (Tubes), Villány Hills, Vörs. It occurs in various habitats, including rich fens and mesotrophic meadows, and rarely and locally on sloping steppes in Mecsek Mountains and on rocky steppes in Villány Hills. The distribution area in Hungary: Transdanubian- and North Hungarian Mountains. It has been collected in Hungary only from colline and mountains areas, but only in small numbers. The moth flies from May to August two generations. Distribution is disjunct in West Palaearctic from Ural Mountains to Iberian Peninsula, Canary Is and NW Africa.

Crocidosema plebejana Zeller, 1847 – Material examined: Dombóvár, Gunaras, 1 ex, 5-15.06.2003; 1 ex, 26.07. – 06.08.2010, det. F. Groenen. First recorded from Transdanubian Hills (BALOGH 1978, FAZEKAS 2002): Pécs, (Árpád-tető).

The first habitat is a sylvan environment in a residential area, effectively a sylvan clearing, where there are private gardens and small orchards. The second habitat (Gunaras) an old, spa areas in agricultural country a in which there are some industrial areas. Generally rare and local in Hungary: Aggtelek National Park, Vértes Mts, Bakony Mts. Cosmopolitan, and widely distributed in every Continent.

Cydia exquisitana (Rebel, 1889) – Material examined: Dombóvár, Gunaras, 2 ex, 14-28.07.2007, det. F. Groenen.

New species to the Transdanubian Hills fauna. Our second record from Hungary. According to SPULER (1910) the species occurs in south Hungary ("im südlichen Ungarn") but the localities are unspecified. Occurrence in Hungary documented only from the middle 20th century (GOZMÁNY 1968) but no recent record from country. It was collected only near Budapest in Hungary (in coll. HNHM; Zs. Bálint pers. comm.): 1 ex,

Csepel sz. │Uhryk, [1]905.VI.18. │ exquist. Rbl. │ det. Rbl. │ Lasp. │ exquisitana Rbl. │ V. Kuznesov det. The abdomen lost, there is no genital preparation. The nominotypical subspecies was described from Austria ("Prater bei Wien"); the ssp. *coeruleosparsana* Filipjev, 1925 was described from South Siberia. Distribution in Europe: Austria, France, Germany (only in Bayern), Hungary, Italy, Poland, Romania, Russia South, Slovakia, Switzerland.

Dichrorampha heegerana (Duponchel, 1843) – Material examined: Dombóvár, Gunaras, 1♂, 06.08.2010, det. F. Groenen. Known in only two localities from Transdanubian Hills: Komló, Pécs (FAZEKAS 2002). Sporadically distributed in Hungary: Bakony Mts, Vértes Mts, Aggtelek karst landscape, Jászság area.

Dichrorampha flavidorsana Knaggs, 1867 – Material examined: Dombóvár, Gunaras, 1 ex, 26.07. – 06.08.2010, det. F. Groenen. GOZMÁNY (1968) also mentioned the species under this name, although no voucher specimens are deposited in the collection of the Hungarian Natural History Museum. Data of the specimens in coll. HNHM (with original labels): Budapest, Farkasvölgy, 1912.VI.6., leg. Uhrik; Kaposvár, 1925.VIII.10., leg. Pazsicky; Eger, Tihamér, 1946.VII.2., leg. Reskovits; Makkoshotyka, 1961.VII.28., fénycsapda [light trap]; Tompa, Alsósáskalapos, 1974.VII.14., fénycsapda (coll. Szőcs); Budakeszi, ERTI-telep, 1974.VII.30., fénycsapda (coll. Szőcs). Data on the specimens outside country in coll. HNHM from Romania: Borosjenő, 1914.VI.27., leg. Diószeghy; Csiki-havasok, Jávorhegy, 1943.VII.23., leg. Szent-Iványi. Additional data in private collection of F. Buschmann (H-Jászberény): Gyöngyös, Sár-hegy, 3 ex, 06.06.2003; 21.06.2006; 11.06.2010; Nagykáta, Székesrekeszi-legelő, 1 ex, 15.07.2009, leg. F. Buschmann. Meanwhile the number of known *Dichrorampha flavidorsana* specimens from four has grown to more than ten.

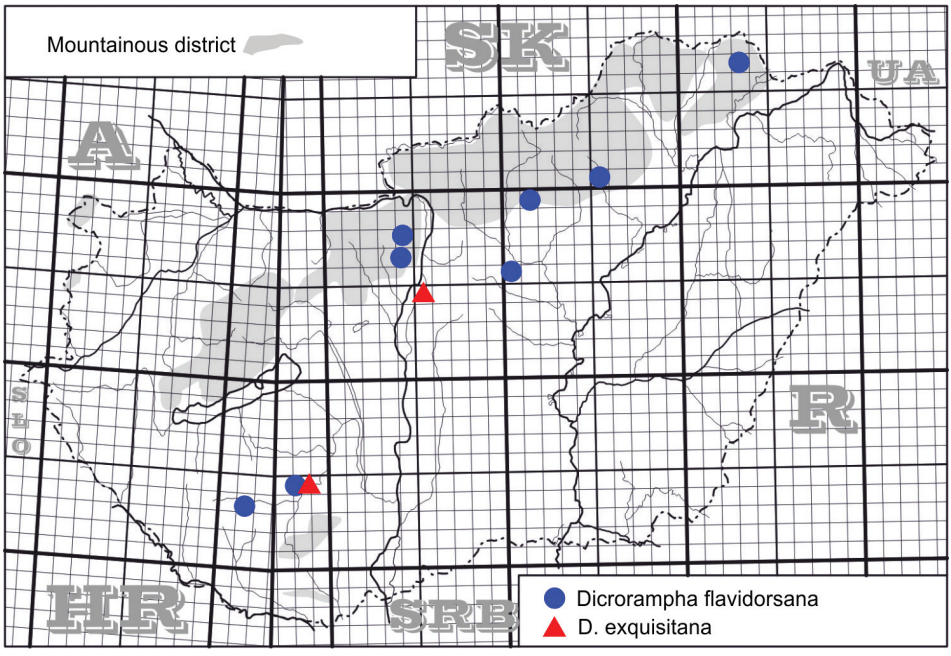

Fig. 7: Recent distribution area of *Dicrorampha flavidorsana* and *D. exquisitana* in Hungary

The species occurs from western Siberia to Iberian Peninsula. The flight period is in one generation from June to August. The larva oligophagous on *Chrysanthemum leucanthemum* and *Ch. vulgare*. Habitat in Hungary: rich fens, eu- and mesotrophic meadows and tall herb communities; colline and montane hay meadows, acid grasslands and heaths; thermophilous woodland fringes; semi-natural vegetation of abandoned vineyards and orchards and trampled swards.

Dichrorampha vancouverana McDunnough, 1935 (= *gueneeana* Obraztsov, 1953) – Material examined: Dombóvár, Gunaras, 1 ex, 12-23.07.1999, gen. prep. F. Groenen, No. 2008. Rare and local in Transdanubian Hills (FAZEKAS, 2001, 2002; SZABÓKY 2000): only from Villány Hills, in calcareous open rock grasslands. The occurrence is uncertain in Somogy County (FAZEKAS 2002). Sporadic and xerothermophilous species in Hungary: Zemléni Mts, Bükk Mts, Vértes Mts and Szigetköz area.

Eana incanana (Stephens, 1852) – Material examined: Dombóvár, Gunaras, 1♂, 05-15.06.2003, gen. prep. Schreurs. No. 901. Known only in one locality in Transdanubian Hills: from Kárász, in kitchen gardens and waterside and fen tall herb communities (FAZEKAS 2002). Distribution in Hungary: Bükk Mts, Mátra Mts (Sár-hegy), Bakony Mts (Tihany), Great Hungarian Plain (Sárvíz areas [salt meadows] and Jászság areas [sand steppes]).

Grapholita delineana (Walker, 1863) – Material examined: Dombóvár, Gunaras, 1 ex, 26.07. – 06.08.2010, det. F. Groenen. Only a single record published from Transdanubian Hills (FAZEKAS 2002): from Mecsek Mountains (Pécs-Vasas), in oak-hornbeam woodland associations. The species is sporadically distributed in Hungary: Bakony Mts, Vértes Mts and Mátra Mts.

Hedya ochroleucana (Frölich, 1828) – Material examined: Dombóvár, Gunaras, 1♂, 15.06.2003; 1♀, 28.07.2010; 1♂, 08.08.2008. Localities in southern Transdanubia: only two data (Komló, Pécs) in Mecsek Mountains (FAZEKAS 2002). Sporadically distributed in Hungary: Bükk and Mátra Mountains (ÁCS & SZABÓKY 1993, BUSCHMANN 2004).

Pelochrista decolorana (Freyer, 1842) – Material examined: Dombóvár, Gunaras, 1♂, 5-15.06.2003, gen. prep. Schreurs, No. 874. In the Transdanubian Hills known only from the Somogy county (FAZEKAS 2002). Fairly widely distributed in Hungary: North Hungarian Mountains and Great Hungarian Plain (Sárvíz and Jászság regions).

Pelochrista modicana (Zeller, 1847) – Material examined: Dombóvár, Gunaras, 1♂, 25-31.08.1998, gen. prep. Schreurs, No. 898. New to the fauna of the Transdanubian Hills. There is only one reliable reference from the area of Hungary from July 1978 and June 1999 when Pastorális and Szeőke caught two specimens in Vértes Mountains (PASTORÁLIS & SZEŐKE 2011). *P. modicana* is apparently very rare and local in Hungary, but could be overlooked and therefore careful search should be made.

PYRALIDAE

Ancylosis oblitella (Zeller, 1848) – Material examined: Dombóvár, Gunaras, 2♀, 1-12.09.2003, det. J. Asselbergs. Second record in the Transdanubian Hills (see FAZEKAS 1996, 2002). Widely distributed in much of Hungary (FAZEKAS 1996).

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A Koppány-völgyi lepkefauna vizsgálatának első eredményei (Lepidoptera)

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Horváth, B., Sáfián, Sz. & Kovács Gy.: *First results of the study of the Lepidoptera fauna in the Koppány Valley (South-western Hungary)*.

Abstract: The Lepidoptera fauna in the Külső-Somogy region (Somogy County) in southwestern Hungary is generally under-recorded, despite the fact that the area hosts a diverse landscape and a wide range of natural and semi-natural habitats. As part of the landscape-scale habitat rehabilitation program the authors conducted a series of surveys on the butterfly and macro moth fauna (Rhopalocera and Macroheterocera) of the Koppány valley between the villages Somogydöröcske and Gerézdpuszta in 2010 including the catchment area and the floodland of the stream Koppány. In total 192 species were recorded between April and October. The Lepidoptera fauna is characterized by species associated with wet habitats near the stream (*Lycaena dispar rutilus, Chariaspilates formosaria*), but is also influenced by the warm broad-leaved woodlands and orchards that surrounds the valley (*Meganephria bimaculosa*). The change of land-use in the study area threatens the butterfly fauna through the intensification of agriculture (application of pesticides), and the complete cessation of animal husbandry.

Keywords: Lepidoptera, butterflies, macro moths, Koppány valley, Hungary, land-use.

Bevezetés

Külső-Somogy Magyarország egyik lepkészeti szempontból kevéssé kutatott területe. Kovács (1953, 1956) faunamunkáiban szerepeltetett szórványadatain kívül csak 3 további közleményt ismerünk: Balaton-Zamárdi környékén Rézbányai (1972) gyűjtött pár alkalommal, Thuróczy (1984) növényvédelmi fénycsapdák adatait dolgozta fel, illetve Ábrahám (2003) közölt tanulmányt a Látrányi-puszta természetvédelmi terület lepkéiről. Jelen közleményben a Koppány-patak völgyének Somogydöröcske és Gerézdpuszta közötti – kb. 1,5 km hosszú – szakaszán (1. ábra), 2010-ben végzett éjszakai- és nappali lepke felmérések eredményeit ismertetjük.

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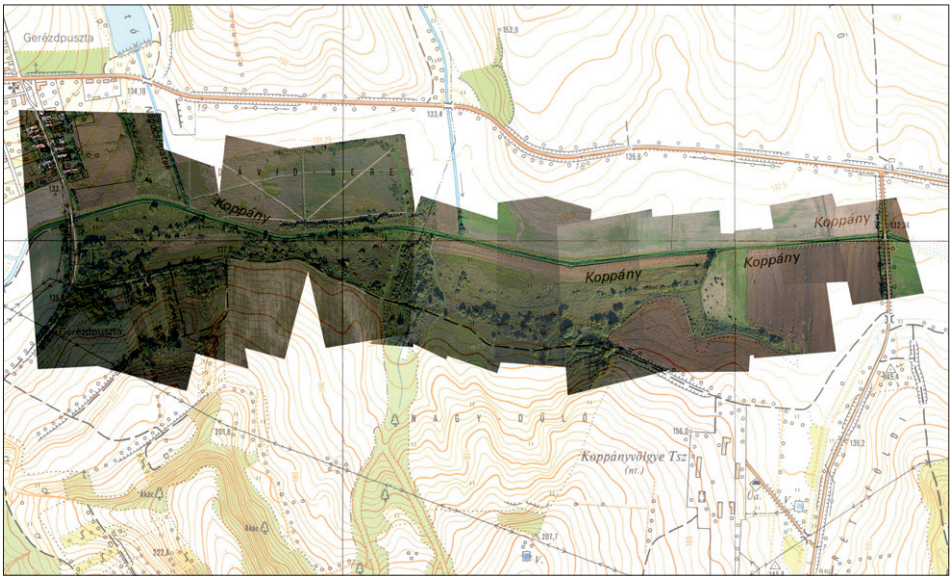
Anyag és módszer

A vizsgálati terület egy igen diverz élőhelykomplex. Jellemző élőhelyei a dombtetői meleg cseresek, félszáraz legelők, felhagyott szántón vagy legelőn kialakult cserjések, illetve a patakvölgy magaskórósai és fűz-ligetei. A területen jelentős a mezőgazdasági területek aránya, amelyek főleg a Koppány-patak völgyének magasabb térszintű parcelláin és a domboldalakon fekszenek.

A korábban legeltetéssel hasznosított területeket mára mindenütt felhagyták, ezek a legelőterületek erősen elgyomosodtak, becserjésedtek. Az egykor nagykiterjedésű cseresek helyén ma sokfelé ültetett akácosokat találunk. Ugyanez a jelenség a Törökkoppányi-erdő Natura 2000 területein is megfigyelhető, ahol az évtizedek óta tartó tarvágások, a tájidegen fafajok telepítése és az özönfajok terjedése miatt jelentősen visszaszorultak a természetközeli állományok (BAUER és MÁRKUS 2008).

A felmérés során az éjszakai nagylepkéket és a nappali lepkéket egyaránt vizsgáltuk. A nappali lepkefajokat terepbejárás során hálóval elfogtuk, majd határozás után szabadon engedtük. Az éjszakai lepkék megfigyelését lámpázással végeztük, amelyhez generátort és 160 W-os kevert fényű izzót használtunk. A lámpázással nyert adatokat hordozható fénycsapdákkal gyűjtött adatokkal egészítettük ki. A csapdák 8 W-os UV fénycsővel 12V-os zselés akkumulátorról működtek. A felmérés a Koppány-patak völgyére és a vízgyűjtő területre (félszáraz domboldal) egyaránt kiterjedt, amely lehetőséget adott a völgytalpi nedvesebb élőhelyek (nádas, fűzbokor liget, magaskórós) illetve a szárazabb lejtők (zavart félszáraz gyep és cseres erdőfoltok) lepkefaunájának vizsgálatára is. A mintavételezést havi rendszerességgel végeztük el 2010-ben, áprilistól októberig.



1. ábra: A vizsgálati terület térkép és légifotó kompozit-ábrán

Eredmények

A vizsgálatok során 146 éjszakai és 46 nappali lepkefajt határoztunk meg, amelyek közül több faj természetvédelmi jelentőséggel bír. Védett faj: 12, az Élőhely Irányelv (Natura 2000) függelékeiben szereplő faj: 2, míg 4 további faj a vörös könyv alapján hazánkban veszélyeztetett (VARGA 1989). Három lepkefaj külső-somogyi előfordulása kiemelt állatföldrajzi jelentőséggel bír. A fajok listáját VARGA (2010) munkája alapján készítettük el.

Lasiocampidae
Euthrix potatoria (Linnaeus, 1758)
Odonestis pruni (Linnaeus, 1758)
Lasiocampa quercus (Linnaeus, 1758)
Macrothylacia rubi (Linnaeus, 1758)
Gastropacha quercifolia (Linnaeus, 1758)

Sphingidae
Agrius convolvuli (Linneaus, 1758)
Sphinx ligustri (Linneaus, 1758)
Hyloicus pinastri (Linnaeus, 1758)
Laothoe populi (Linneaus, 1758)
Mimas tiliae (Linnaeus, 1758)
Smerinthus ocellatus (Linnaeus, 1758)
Macroglossum stellatarum (Linnaeus, 1758)
Proserpinus proserpina (Pallas, 1772)
Deilephila elpenor (Linnaeus, 1758)
Deilephila porcellus (Linnaeus, 1758)

Saturniidae
Antheraea yamamai (Guérin-Méneville, 1861)

Thyatiridae
Thyatira batis (Linnaeus, 1758)
Habrosyne pyritoides (Hufnagel, 1767)

Geometridae
Thetidia smaragdaria (Fabricius, 1787)
Hemistola chrysoprasaria (Esper, 1795)
Jodis lactearia (Linnaeus, 1758)
Hemithea aestivaria (Hübner, 1789)
Chlorissa viridata (Linnaeus, 1758)
Idaea muricata (Hufnagel, 1767)
Idaea aversata (Linnaeus, 1758)
Scopula immorata (Linnaeus, 1758)
Scopula caricaria (Reutti, 1853)
Scopula virgulata ([Denis & Schiffermüller], 1775)
Rhodostrophia vibicaria (Clerck, 1759)
Cyclophora albipunctata (Hufnagel, 1767)
Camptogramma bilineata (Linnaeus, 1758)
Cosmorhoe ocellata (Linnaeus, 1758)
Eulithis pyraliata ([Denis & Schiffermüller], 1775)
Colostygia pectinataria (Knoch, 1781)
Horisme vitalbata ([Denis & Schiffermüller], 1775)
Horisme tersata ([Denis & Schiffermüller], 1775)
Philereme vetulata ([Denis & Schiffermüller], 1775)
Philereme transversata (Hufnagel, 1767)
Eupithecia haworthiata Doubleday, 1856
Lomaspilis marginata (Linnaeus, 1758)
Ligdia adustata ([Denis & Schiffermüller], 1775)
Heliomata glarearia ([Denis & Schiffermüller], 1775)
Chiasmia clathrata (Linnaeus, 1758)
Tephrina arenacearia ([Denis & Schiffermüller], 1775)
Plagodis pulveraria (Linnaeus, 1758)
Opisthograptis luteolata (Linnaeus, 1758)
Selenia lunularia (Hübner, 1788)
Angerona prunaria (Linnaeus, 1758)
Lycia hirtaria (Clerck, 1759)
Biston betularia (Linnaeus, 1758)
Synopsia sociaria (Hübner, 1799)
Peribatodes rhomboidaria ([Denis & Schiffermüller], 1775)
Alcis repandata (Linnaeus, 1758)
Hypomecis punctinalis (Scopoli, 1763)
Ascotis selenaria ([Denis & Schiffermüller], 1775)
Ectropis crepuscularia ([Denis & Schiffermüller], 1775)
Ematurga atomaria (Linnaeus, 1758)
Bupalus piniaria (Linnaeus, 1758)
Cabera exanthemata (Scopoli, 1763)
Siona lineata (Scopoli, 1763)
Chariaspilates formosaria (Eversmann, 1837)
Perconia strigillaria (Hübner, 1787)

Notodontidae
Furcula furcula (Clerck, 1759)
Ochrostigma velitaris (Hufnagel, 1767)
Notodonta ziczac (Linnaeus, 1758)
Pheosia tremula (Clerck, 1759)
Euchila palpina (Linnaeus, 1758)
Spatalia argentia ([Denis et Schiffermüller], 1775)
Ptilodon capucina (Linnaeus, 1758)
Ptilodon cucullina ([Denis & Schiffermüller], 1775)
Clostera curtula (Linnaeus, 1758)

Noctuidae
Rivula sericealis (Scopoli, 1763)
Laspeyria flexula ([Denis & Schiffermüller], 1775)
Trisateles emortualis ([Denis & Schiffermüller], 1775)
Herminia tarsicrinalis (Knoch, 1782)
Polypogon tentacularia (Linnaeus, 1758)
Hypena proboscidalis (Linnaeus, 1758)
Hypena rostralis (Linnaeus, 1758)

Scoliopteryx libatrix (Linnaeus, 1758)
Lymantria dispar (Linnaeus, 1758)
Orgya antiqua (Linnaeus, 1758)
Calliteara pudibunda (Linnaeus, 1758)
Arctornis l-nigrum (Müller, 1764)
Spilarctia lutea (Hufnagel, 1766)
Spilosoma lubricipedum (Linnaeus, 1758)
Phragmatobia fuliginosa (Linnaeus, 1758)
Rhyparia purpurata (Linnaeus, 1758)
Diacrisia sannio (Linnaeus, 1758)
Miltochrista miniata (Forster, 1771)
Cybosia mesomella (Linnaeus, 1758)
Pelosia muscerda (Hufnagel, 1767)
Lithosia quadra (Linnaeus, 1758)
Eilema complana (Linneaus, 1758)
Amata phegea (Linneaus, 1758)
Lygephila pastinum (Treitschke, 1826)
Euclidia glyphica (Linnaeus, 1758)
Catocala nupta (Linnaeus, 1767)
Meganola albula ([Denis & Schiffermüller], 1775)
Macdunnoughia confusa (Stephens, 1850)
Diachrysia chrysitis (Linnaeus, 1758)
Diachrysia stenochrysis (Warren, 1913)
Euchalcia modestoides Poole, 1989
Autographa gamma (Linnaeus, 1758)
Deltote bankiana (Fabricius, 1775)
Acontia lucida (Hufnagel, 1766)
Emmelia trabealis (Scopoli, 1763)
Aedia funesta (Esper, 1786)
Aedia leucomelas (Linnaeus, 1758)
Colocasia coryli (Linnaeus, 1758)
Craniophora ligustri ([Denis & Schiffermüller], 1775)
Acronicta megacephala ([Denis & Schiffermüller], 1775)
Panemeria tenebrata (Scopoli, 1763)
Tyta luctuosa ([Denis & Schiffermüller], 1775)
Cucullia umbratica (Linnaeus, 1758)
Meganephria bimaculosa (Linnaeus, 1767)
Allophyes oxyacanthae (Linnaeus, 1758)
Eucarta amethystina (Hübner, 1803)
Eucarta virgo (Treitschke, 1835)
Pyrrhia umbra (Hufnagel, 1766)
Helicoverpa armigera (Hübner, 1808)
Pseudeustrotia candidula ([Denis & Schiffermüller], 1775)
Elaphria venustula (Hübner, 1790)
Caradrina morpheus (Hufnagel, 1766)
Hoplodrina ambigua ([Denis & Schiffermüller], 1775)
Charanyca trigrammica (Hufnagel, 1766)
Trachea atriplicis (Linnaeus, 1758)
Thalpophila matura (Hufnagel, 1766)
Chortodes extrema (Hübner, 1809)
Oligia strigilis (Linnaeus, 1758)
Oligia versicolor (Borkhausen, 1792)
Eupsilia transversa (Hufnagel, 1766)
Conistra vaccinii (Linnaeus, 1758)
Conistra rubiginosa (Scopoli, 1763)
Xanthia togata (Esper, 1788)
Mythimna turca (Linnaeus, 1758)
Mythimna pallens (Linnaeus, 1758)
Mythimna vitellina (Hübner, 1808)
Mythimna albipuncta ([Denis & Schiffermüller], 1775)
Mythimna ferrago (Fabricius, 1787)
Mythimna l-album (Linnaeus, 1758)
Conisania luteago ([Denis & Schiffermüller], 1775)
Mamestra brassicae (Linnaeus, 1758)
Lacanobia w-latinum (Hufnagel, 1766)
Lacanobia oleracea (Linnaeus, 1758)
Hadena bicruris (Hufnagel, 1766)
Orthosia incerta (Hufnagel, 1766)
Orthosia opima (Hübner, 1809)
Tholera decimalis (Poda, 1761)
Agrotis exclamationis (Linnaeus, 1758)
Agrotis segetum ([Denis & Schiffermüller], 1775)
Agrotis ipsilon (Hufnagel, 1766)
Axylia putris (Linnaeus, 1761)
Ochropleura plecta (Linnaeus, 1761)
Noctua pronuba Linnaeus, 1758
Noctua interposita (Hübner, 1790)
Xestia c-nigrum (Linnaeus, 1758)

Hesperiidae
Erynnis tages (Linnaeus, 1758)
Pyrgus malvae (Linnaeus, 1758)
Carterocephalus palaemon (Pallas, 1771)
Ochlodes sylvanus (Esper, 1799)
Thymelicus lineolus Ochsenheimer, 1808
Thymelicus sylvestris (Poda, 1761)

Papilionidae
Iphiclides podalirius (Linneaus, 1758)
Papilio machaon (Linnaeus, 1758)

Pieridae
Colias hyale (Linnaeus, 1758)
Colias alfacariensis Ribbe, 1905
Colias croceus (Geoffroy in Fourcroy, 1785)
Gonepteryx rhamni (Linnaeus, 1758)
Leptidea sinapis (Linnaeus, 1758)
Pieris brassicae (Linnaeus, 1758)
Pieris rapae (Linnaeus, 1758)
Pieris napi (Linnaeus, 1758)
Anthocharis cardamines (Linnaeus, 1758)

Riodinidae
Hamearis lucina (Linnaeus, 1758)

Lycaenidae
Lycaena dispar rutilus (Werneburg, 1864)
Satyrium pruni (Linnaeus, 1758)
Celastrina argiolus (Linnaeus, 1758)
Cupido argiades (Pallas, 1771)

Cupido alcetas (Hoffmannsegg, 1804)
Plebejus argus (Linnaeus, 1758)
Plebejus idas (Linnaeus, 1758)
Aricia agestis ([Denis & Schiffermüller], 1775)
Cyaniris semiargus (Rottemburg, 1775)
Polyommatus icarus (Rottemburg, 1775)

Nymphalidae
Libythea celtis (Laicharting in Fuessly, 1782)
Brenthis daphne ([Denis & Schiffermüller], 1775)
Apatura ilia ([Denis & Schiffermüller], 1775)
Melitaea diamina (Lang, 1789)
Melitaea athalia (Rottemburg, 1775)
Melitaea aurelia Nickerl, 1850
Araschina levana (Linneaus, 1758)
Nymphalis io (Linneaus, 1758)
Nymphalis c-album (Linnaeus, 1758)
Vanessa atalanta (Linnaeus, 1758)
Pararge aegeria (Linnaeus, 1758)
Coenonympha arcania (Linneaus, 1758)
Coenonympha glycerion (Scopoli, 1763)
Coenonympha pamphilus (Linnaeus, 1758)
Aphantopus hyperanthus (Linnaeus, 1758)
Maniola jurtina (Linnaeus, 1758)
Melanargia galathea (Linnaeus, 1758)
Minois dryas (Scopoli, 1763)

Megvitatás

A jelentősebb fajok adatainak ismertetése

Proserpinus proserpina (Pallas, 1772)
A faj szerepel az EU Élőhely Irányelvének IV. függelékében és a vörös könyvben, mint potenciálisan veszélyeztetett faj. Tipikusan nedves helyeken fordul elő, egy alkalommal, lámpázás során figyeltük meg több példányát.

Chariaspilates formosaria (Eversmann, 1837)
A vörös könyv, mint potenciálisan veszélyeztetett fajt említi (VARGA 1989). Hazánkban elsősorban lápvidékekről ismert (VOJNITS 1980), Külső-Somogyban a Látrányi Puszta Természetvédelmi Területről vannak publikált adatai (ÁBRAHÁM 2003); Sáfián Szabolcs és Kovács Gyula Balatonlellén az Irmapusztai-halastavak környékén, bokorfüzekkel mozaikolt patakmenti lápréten találta. Egyetlen példányát 2010.VII.14.-én figyeltük meg.

Perconia strigillaria (Hübner, 1787)
A vörös könyv alapján potenciálisan veszélyeztetett faj (VARGA 1989). Somogy megyében elsősorban a Zselic területéről ismert (UHERKOVICH 1982, ÁBRAHÁM et al. 2009), a felmérés során egy alkalommal észleltük 2010.V.25-én.

Euchalcia modestoides Poole, 1989
A vizsgált területen kiemelkedő állatföldrajzi jelentőségű faj. Közép-Európában elsősorban hegyvidékeken fordul elő, hazánkban csak az Északi-középhegység egyes pontjain és a nyugati határszélen gyakoribb. Somogy megyéből korábbi adatai ismertek Nattán Miklós gyűjtéséből (ÁBRAHÁM és UHERKOVICH 2001). A Zselicben régen is szép számmal tenyészett és a közelmúltban, 1980–2000 között a tarvágások után néhány évvel – a tápnövénye (*Pulmonaria mollis*) elterjedésével – populációi megnövekednek (Ábrahám Levente szóbeli közlése). A felmérés során egyetlen példánya került elő, 2010. VI. 12-én.

Aedia leucomelas (Linnaeus, 1758)
Első hazai példányait ÁBRAHÁM és UHERKOVICH (2000) a Villányi-hegységben több helyről említi, azóta az ország más területein is elterjedt. A Mediterráneum felől észak felé terjedő bagolylepke faj (SZABÓKY et al. 2001). Korábban csak egyetlen példánya volt

ismert Külső-Somogyból (Látrányi Puszta Természetvédelmi Terület leg.: Sáfián Sz.). Elterjedésének korábbi határát az Adriai-tenger partvidékének vélték (GOZMÁNY 1970). Feltételezhető, hogy az afrotrópikus-mediterrán faj északi irányú terjedéséért a klímaváltozás hatására bekövetkező melegedés is felelős lehet.

Meganephria bimaculosa (Linnaeus, 1767)

Európa mediterrán és középső területein előforduló, de sehol sem gyakori faj. Száraz, ritkás erdők, elhagyatott gyümölcsösök (RONKAY és RONKAY 2006), patakvölgyek lakója, ahol tápnövényei (*Ulmus* spp., *Prunus* spp.) előfordulnak. A felmérések során 1 alkalommal került elő a domboldalban lévő kaszált bio-dió ültetvény területén.

Lycaena dispar rutilus (Werneburg, 1864)

Hazánkban védett faj, szerepel az Élőhely Irányelv (Natura 2000) II. és IV. függelékében is. Elsősorban nedvesebb élőhelyekhez (láprétek, árokpartok stb.) kötődik, különböző *Rumex* fajokon fejlődik (GOZMÁNY 1968). A vizsgálat során több alkalommal is előkerültek példányai a Koppány-patak mentén.

Apatura ilia ([Denis & Schiffermüller], 1775)

Hazánkban védett, a vörös könyvben potenciálisan veszélyeztetett fajként szerepel (VARGA 1989). Alföldi fűz ligetekben, domb- és hegyvidéki patakvölgyek bokorfüzeseiben egyaránt előfordul. Elsősorban fűz fajokon (*Salix* spp.) fejlődik (GOZMÁNY 1968). Mind a patakvölgyben, mind pedig a magasabban fekvő vízgyűjtő területen megfigyeltük több példányát.

A lepkefauna és a tájhasználat összefüggései

A felmérések során előkerült lepkefajok a vizsgált terület magas élőhely-komplexitását támasztották alá. A szárazabb élőhelyek fajai (pl.: *Aedia leucomelas, Meganephria bimaculosa*) éppúgy előkerültek a vizsgálatok során, mint a hűvösebb patakvölgyeket, vagy lápréteket preferáló lepkefajok (pl. *Chariaspilates formosaria*).

Az eredmények alapján a terület legértékesebb lepkeélőhelyeinek a Koppány-patak menti vizes rétek, magaskórósok és puhafa ligeterdők bizonyultak, amelyeket az invazív óriás aranyvessző (*Solidago gigantea*) terjedése veszélyeztet. Nem elhanyagolható ezen élőhelyek kiszáradás okozta beszűkülése és eltűnése, ami egyértelműen a Koppány-patak mederszabályozásának következménye. Egy esetleges meder-rehabilitáció jelentősen növelné az élőhelyek minőségét, és lehetőséget teremtene a már megsemmisült életterek másodlagos kialakulására. Számos faj számára további jelentős élőhelyet nyújtanak a félszáraz gyepekkel borított, mára teljesen felhagyott legelők. Ezek esetében gondot jelent a gyomosodás, melynek oka a hagyományos gazdálkodási módok megszűnése, az állattartás visszaszorulása, ami az országban számos más helyen is komoly természetvédelmi probléma. A természetközeli élőhelyek beszűkülését tovább fokozta a területek intenzív mezőgazdálkodási kultúrába történő bevonása. A vízgyűjtőterületen lévő nagy kiterjedésű szántóterület megléte jelentős veszélyeztető tényező egyes lepkefajok esetében (például inszekticidek alkalmazása miatt).

A felsorolt veszélyforrások és a hagyományos tájhasználat megszűnése ellenére elmondható, hogy a Koppány-patak völgyének Somogydöröcske és Gerézdpuszta közötti szakasza még gazdag lepkefaunát tart fenn. A területen emellett több, természetvédelmi szempontból jelentős lepkefaj is előfordul. Feltételezhető, hogy a mintaterületen tenyésző lepke-populációk képesek lennének a regenerálódásra, de ehhez az ártéren és a vízgyűjtő területen végzett intenzív gazdálkodási módok megszüntetése és a terület

hosszú távú természetvédelmi kezelése szükséges. Ezt helyettesíthetné a korábbi hagyományos tájhasználat visszahonosítása. A gyenge termőképességű talajon a szántóföldi növénytermesztés helyett, inkább az extenzív legeltetést vagy istállózó állattartást kellene újra előtérbe helyezni. Érdemes volna a megfelelő termőhelyű területeken kaszálógyümölcsösök létrehozása is, amelyre jelenleg csak kísérleti szinten van példa (Somogydöröcske bio-dió ültetvény).

A lepkefauna vizsgálatának és az élőhelyek értékelésének folytatása lehetővé tenné az élőhelyek hatékonyabb védelmét, és a lepkediverzitást is védő ún. szimpatikus tájhasználat kidolgozását.

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A comparative study of breeding bird communities in representative habitats of the Sárosfő Nature Reserve area

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Winkler, D. & Erdő, Á.: *A comparative study of breeding bird communities in representative habitats of the Sárosfő Nature Reserve area.*

Abstract: This paper presents the results of breeding bird community surveys conducted in 2010 in the Sárosfő Nature Reserve area. The main goal was to determine species richness, diversity, density- and dominance structures in the bird communities of different forest, meadow and reed habitats. Bird community composition data were obtained by conducting standard transect counts carried out twice during the breeding season. The method used was suitable for recording pigeon- (*Columbiformes*), woodpecker- (*Piciformes*) and passerine bird (*Passeriformes*) species. A total of 44 bird species were encountered. Diversity was the highest in the riverine ash-alder woodland habitat and the lowest in the reedbed habitat. Breeding bird community structure comparison between the different habitats was estimated using single linkage cluster analysis based on the Morisita-Horn similarity index that well emphasized the separation of three habitat groups (reed bed, open and forest habitats). The results showed that the rich mosaic habitat structure of the relatively small area provides optimal nesting and feeding grounds not only for waterfowl related to the fishponds but also for passerine bird communities.

Keywords: breeding bird communities, bird diversity, mosaic habitat structure

Introduction

Ornithological studies related to fishponds in Hungary mostly focus on waterbird species (e.g. Kovács 1984, Musicz 1988, Kovács et al. 2011) while there are only very few reports on breeding bird communities in the oftentime diverse surrounding habitats (Schmidt 1963, Sterbetz 2002). Several researches have shown that vegetation structure, its complexity and spatial dispersion are the primary determining factors in bird community composition (MacArthur & MacArthur 1961, Wilson 1974, Blicke 1982), while other authors have pointed out that floristic composition can also play an important role (Wiens & Rotenberry 1981, Moskát 1988, Whelan 2000). The vicinity of water bodies has always a considerable impact on animal communities, including the avifauna. The aim of our study was to survey and describe species composition of breeding bird communities of different habitats surrounding the Sárosfő fishponds and to determine their species diversity, density- and dominance structures.

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Material and Methods

Study area

The Sárosfő Nature Reserve area is situated in the valley of the Kígyós Stream (47° 3'18"N, 17°23'42"E; 165m above sea level), 6 km from the city Devecser, Veszprém county, Hungary. Its total area is 261.4 ha, while the fishpond system covers 32 ha. The fishponds are surrounded with reedbeds, different aged and types of forests and meadows. Bird surveys were conducted in 6 different habitat types including both open and forest habitats (Fig.1). The main characteristics of the surveyed habitats are given below.

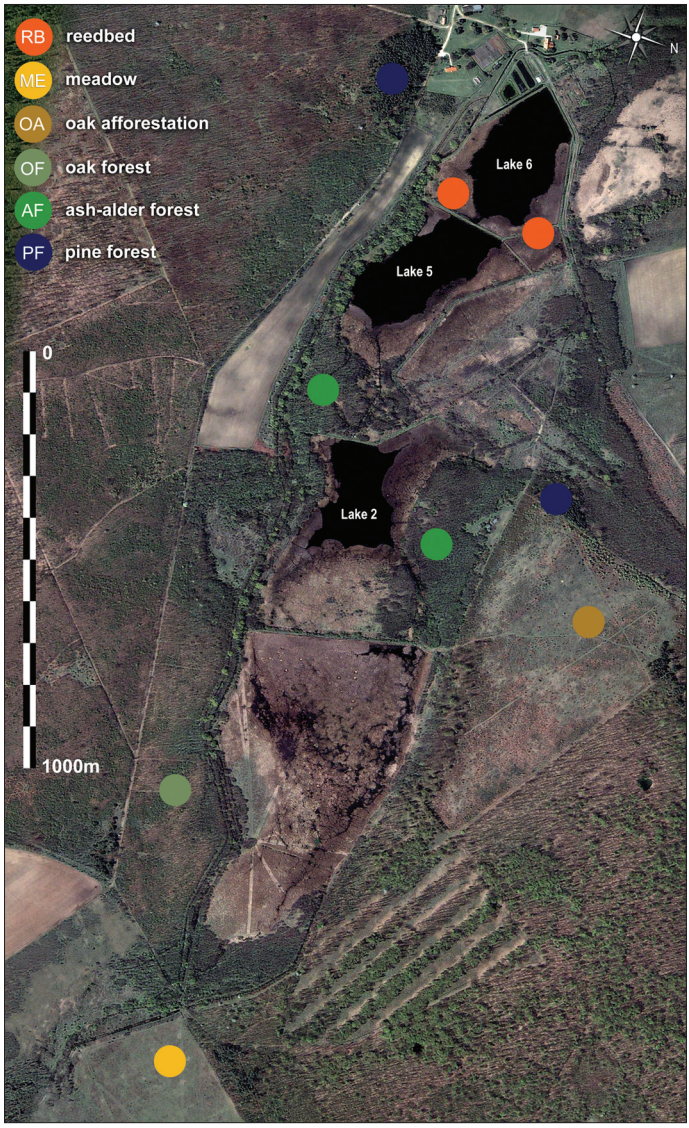

Fig. 1: Survey sites around the Sárosfő fishpond system (Google Earth)

reedbeds (RB): reedbeds around the lakes composed dominantly by Common Reed (Phragmites australis) and dispersedly also by Narrow-leaf Cattail (*Typha angustifolia*) and Broadleaf Cattail (*Typha latifolia*).

meadow (ME): Pastinaco-Arrhenatheretum, a layered meadow association with an average hight of 120 cm. Apart from the dominant Tall Oatgrass (*Arrhenatherum elatius*) further characteristic species are the Wild Carrot (*Daucus carota*), the Cocksfoot (*Dactylis glomerata*), the Field Wood-rush (*Luzula campestris*), the Tall Buttercup (*Ranunculus acris*) and the German Catchfly (*Viscaria vulgaris*).

young pedunculate oak afforestation (OA): afforestation in an early successional stage. Average tree height is about 1.7 m. The cover of young trees is 30–35%. The main tree species is the Pedunculate Oak (*Quercus robur*), scattered trees of European Hornbeam (*Carpinus betulus*) and Small-leaved Lime (*Tilia cordata*) can be found too. Additional species in this 'shrub layer' include the Hawthorn (*Crataegus monogyna*), the European Privet (*Ligustrum vulgare*) and the Blackberry (*Rubus fruticosus*). The cover of herb layer is high (80–85%) with typical species like the Giant Goldenrod (*Solidago gigantea*), the Chee Reed Grass (*Calamagrostis epigeios*) and the Cocksfoot (*Dactylis glomerata*).

low-pole turkey oak–pedunculate oak stands (OF): height of the trees 10–14 m. The coverage of the tree layer is rather high (~80%). Apart from the main tree species, the Turkey Oak (*Quercus cerris*) and the Pedunculate Oak (*Quercus robur*), scattered trees of European Ash (*Fraxinus excelsior*), Silver Birch (*Betula pendula*) and European Alder (*Alnus glutinosa*) are also present. The shrub layer is developed moderately with a coverage of about 20–25%. Common species in this layer are the Common Dogwood (*Cornus sanguinea*), the Hawthorn (*Crataegus monogyna*) and the European Spindle (*Euonymus europaeus*). The cover of the herbaceous layer is considerably high (~60%) including species like the Wood Bluegrass (*Poa nemoralis*), the Wood Melick (*Melica uniflora*) and the Sweet Woodruff (*Galium odoratum*).

riverine ash-alder forest (AF): stands along the Kígyós stream and northwards from Lake 2. Average tree height is 20 m, the cover of the tree layer is 85–90%. Apart from the main tree, the European Alder (*Alnus glutinosa*), the European Ash (*Fraxinus excelsior*) and the (*Salix alba*) is also present with proportion of 5% each. The shrub layer has moderate cover (30–35%) and includes species like the Common Dogwood (*Cornus sanguinea*), the Alder Buckthorn (*Frangula alnus*) and the Old Man's Beard (*Clematis vitalba*). Typical species in the moderately developed herb layer are the Stinging Nettle (*Urtica dioica*), the Goutweed (*Aegopodium podagraria*), the Hollowroot (*Corydalis cava*) and the Spinulose Woodfern (*Dryopteris carthusiana*).

allochthonous Scots pine forest (PF): almost pure Scots Pine (*Pinus sylvestris*) stands with scattered trees of Pedunculate Oak (*Quercus robur*). In the moderately developed shrub layer we can find the Elder (*Sambucus nigra*), the Hawthorn (*Crataegus monogyna*) and the Blackberry (*Rubus fruticosus*). The herbaceous layer is poor, mostly composed by Cocksfoot (*Dactylis glomerata*) and Greater Celandine (*Chelidonium majus*).

Survey methods

Bird community composition data were obtained by conducting standard transect counts using the data of the belts of 25 m on both sides of the observer (BÁLDI et al. 1997). For the bird survey nearly same-sized sample areas (~6 ha) were selected from each habitat type. Bird censi were carried out twice during the breeding season (once in April and once in late May 2010). Observations took place in early mornings (about 5.00–9.00 am). The method used was suitable for recording pigeon- (*Columbiformes*), woodpecker- (*Piciformes*) and passerine bird (*Passeriformes*) species only.

Data analysis

Relative density values for all species per habitat type are given. Out of the results of two bird censi (carried out in April and May) the higher density values were chosen for each species. Habitat-amplitude (HA) for each bird species was measured by calculating 'niche-breadth' from the Simpson index (CHESSEL et al. 1982). Bird community structural characteristics were calculated for each habitat. Apart from the actual species richness, bird communities were evaluated by comparing total density, dominance structure (community dominance index - CDI), Shannon diversity index ($H' = -\Sigma\ p_i \ln p_i$) and equitability ($J = H' / \ln S$ - where S is species richness). To compare diversity values of two assemblages a t-test was used to determine whether they are significantly different (HUTCHESON 1970). Rényi diversity profiles (TÓTMÉRÉSZ 1997) were used for partial ranking of the recorded bird communities based on diversity. A community of higher diversity has a diversity profile consistently above the profile of a less diverse community. In case the diversity profiles cross each other, the communities are not comparable, and thus the diversity comparison carried out by using t-test gets overruled.

Community structure comparison between the different habitat types was estimated using single linkage cluster analysis based on the Morosita-Horn index of similarity (MAGURRAN 2004). This index is nearly independent of sample size and it is recommended as one of the best overall measures of similarity for ecological use (WOLDA 1981, KREBS 1999).

Breeding bird communities were also analyzed in relation to the species' migratory habits (BLICKE 1984).

Statistical analyses were carried out using the software Past ver. 2.15 (HAMMER et al. 2001).

Results and Discussion

During the survey days a total of 44 bird species were encountered. Table 1 shows the pair density and habitat amplitude of each bird species occurred. About 57% of the observed species appeared in more than one habitat. Species with the highest habitat-amplitude, like the Common Chiffchaff (*Phylloscopus collybita*), the Chaffinch (*Fringilla coelebs*), the Common Blackbird (*Turdus merula*) and the European Robin (*Erithacus rubecula*), can be regarded as habitat generalists, appearing with high densities in four or at least in three habitats. Species having relatively small habitat amplitude can be considered as habitat specialists. Some of this species are connected to certain vegetation type, such as the reed warblers (*Acrocephalus* spp.) to the reedbeds or the Coal Tit (*Parus ater*) to the pine plantation, while others are characteristic for open habitats as manifested by the appearance of the Skylark (*Alauda arvensis*), Corn Bunting (*Emberiza calandra*) in the surveyed meadow. The occurrence of the Grasshopper Warbler (*Locustella naevia*) in the oak afforestation is an interesting yet not unusual phenomenon anymore. This species was very rare until the 1980's and appeared only in wet meadow habitats. It was first reported by KÁRPÁTI (1982) that this species might appear as breeding species in completely new habitats, such as clear-cut areas and young afforestations. In the bird community of the ash-alder forest we recorded two species that can be considered as habitat specialists. Both the Eurasian Wren (*Troglodytes troglodytes*) and the Icterine Warbler (*Hippolais icterina*) are typical species that prefer riverine forests for nesting.

Table 1: Density values (pairs/10 ha) of bird species in the studied habitat and bird species habitat amplitude by calculating 'niche-breadth' from the Simpson index

(RB – reedbed, ME – meadow, OA – oak afforestation, OF – oak forest, AF – ash-alder forest, PF – Scots pine forest; HA – habitat amplitude)

Species	RB	ME	OA	OF	AF	PF	*HA*
Columba palumbus	-	-	-	-	2.13	3.23	1.92
Streptopelia turtur	-	-	1.79	-	2.13	-	1.98
Dryocopus martius	-	-	-	-	0.71	-	1.00
Dendrocopos major	-	-	-	-	3.55	3.23	1.99
Alauda arvensis	-	0.99	-	-	-	-	1.00
Anthus trivialis	-	-	2.68	-	-	-	1.00
Troglodytes troglodytes	-	-	-	-	2.84	-	1.00
Prunella modularis	-	-	0.89	-	-	-	1.00
Erithacus rubecula	-	-	-	5.32	3.55	3.23	2.85
Luscinia megarhynchos	-	-	-	-	0.71	-	1.00
Saxicola torquatus	-	1.98	4.46	-	-	-	1.74
Turdus merula	-	-	2.68	3.19	4.26	-	2.89
Turdus philomelos	-	-	-	-	2.84	3.23	1.99
Turdus viscivorus	-	-	-	-	0.71	-	1.00
Locustella naevia	-	-	0.89	-	-	-	1.00
Locustella luscinioides	0.95	-	-	-	-	-	1.00
Acrocephalus scirpaceus	1.90	-	-	-	-	-	1.00
Acrocephalus palustris	0.48	-	-	-	-	-	1.02
Acrocephalus arundinaceus	2.86	-	-	-	-	-	1.00
Hyppolais icterina	-	-	-	-	0.71	-	1.00
Sylvia atricapilla	-	-	3.57	-	4.96	-	1.95
Sylvia nisoria	-	-	0.89	-	-	-	1.00
Sylvia curruca	-	-	0.89	-	-	-	1.00
Phylloscopus collybita	-	-	4.46	5.32	4.26	3.23	3.88
Muscicapa striata	-	-	-	2.13	0.71	-	1.60
Ficedula albicollis	-	-	-	-	2.13	-	1.00
Aegithalos caudatus	-	-	-	1.06	0.71	-	1.92
Parus palustris	-	-	-	3.19	3.55	-	2.00
Parus cristatus	-	-	-	-	2.13	3.23	1.92
Parus ater	-	-	-	-	-	3.23	1.00
Parus caeruleus	-	-	-	3.19	3.55	-	2.00
Parus major	-	-	0.89	5.32	4.96	-	2.33
Sitta europaea	-	-	-	2.13	2.13	-	2.00
Certhia brachydactyla	-	-	-	2.13	1.42	-	1.93
Oriolus oriolus	-	-	-	-	0.71	-	1.00
Lanius collurio	-	-	2.68	-	-	-	1.00
Garrulus glandarius	-	-	-	1.06	0.71	-	1.92
Sturnus vulgaris	-	-	-	-	0.71	-	1.00
Fringilla coelebs	-	-	-	8.51	7.80	6.45	2.96
Carduelis chloris	-	-	1.79	-	-	-	1.00
Carduelis cannabina	-	-	2.68	-	-	-	1.00
Coccothraustes coccothraustes	-	-	-	1.06	-	-	1.00
Emberiza citrinella	-	1.98	6.25	-	-	-	1.58
Emberiza calandra	-	0.99	-	-	-	-	1.00
Sum	6.19	5.94	37.50	43.62	64.54	29.03	

Table 2: Ecological structural characteristics of bird communities in the different habitats
S – species richness, De – total bird density (pairs/10 ha), H' – Shannon's diversity index, J – Pielou's equitability index, CDI – community dominance index (%)

	S	*De*	*H'*	*J*	*CDI*
reedbed	4	6.19	1.205	0.8691	76.92
meadow	4	5.94	1.330	0.9591	66.67
oak afforestation	15	37.50	2.518	0.9299	28.57
oak forest	13	43.62	2.376	0.9265	31.71
ash-alder forest	26	64.54	3.013	0.9249	19.78
pine forest	8	29.03	2.043	0.9826	33.33

The most important structural characteristics of breeding bird communities are presented in Table 2.

Species richness ranged between 4 and 26 in the habitats surveyed (Fig. 2a). Only 4–4 species have been recorded in the reedbeds and meadow, while the habitat with the highest number of species (26) appeared to be the riverine ash-alder woodland. Species richness was relatively high (15) also in the young pedunculate oak afforestation. Bird communities in this shrub stage of secondary forest succession often include species characteristic for open habitats, like the Grasshopper Warbler (*Locustella naevia*), the Common Stonechat (*Saxicola torquata*) and the Yellowhammer (*Emberiza citrinella*) while typical shrubland birds like the Blackcap (*Sylvia atricapilla*), the Common Blackbird (*Turdus merula*) are also present, often in high densities (WINKLER 2005). We encountered only 13 species in the turkey oak–pedunculate oak forest. This low value of species richness can presumably be explained by the age of the surveyed forest stand (WALICZKY 1991). Generally, habitats like these low pole stands are no longer appropriate for species nesting in shrubs such as warblers (*Sylviidae*) and not yet suitable for the hole-nesting ones like woodpeckers (*Piciformes*), flycatchers (*Muscicapidae*) or tits (*Paridae*). From the forest habitats sampled, species richness was the lowest (8) in the

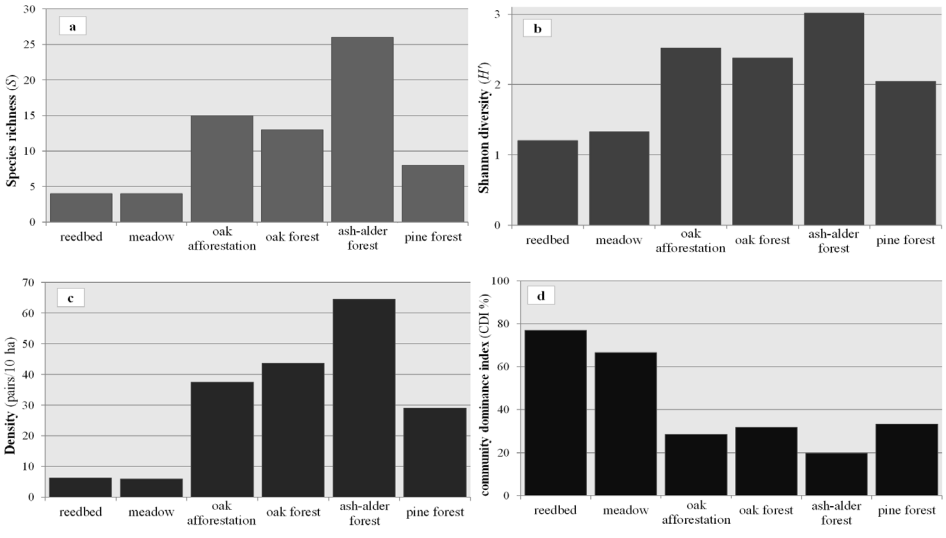

Fig. 2a-d: Species richness, Shannon diversity, density and community dominance index

Table 3: Comparison of Shannon diversities using Hutcheson's t-test
(t-values, ***P=0.01; **P=0.05; *P=0.1; ns – not significant)

	reedbed	meadow	oak afforestation	oak forest	ash-alder forest
meadow	0.0323 ns				
oak afforestation	6.0413**	4.7602**			
oak forest	5.4661**	4.3086**	0.7881 ns		
ash-alder forest	9.2026***	7.0226***	3.9198***	4.8414***	
pine forest	1.9473 ns	1.7179 ns	2.7483*	2.2712*	5.0552***

allochthonous Scots pine forest. Nevertheless, this habitat was responsible for the occurrence and nesting of species connected to coniferous forest, such as the Coal Tit (*Parus ater*) or the Crested Tit (*Parus cristatus*), thus increasing the summarized species richness of the whole study area.

Shannon diversity showed a similar trend (Fig. 2b) expressed in species richness. Its numerical value was the highest (3.013) in the riverine ash-alder woodland area while the lowest (1.205) in the reed habitat.

Breeding pair density was the highest (64.54 pairs/10 ha) in the riverine ash-alder forest, but it was also considerable (~44 pairs/10 ha) in the low pole oak stand (Fig. 2c). Total density of bird community was fairly low (~6 pairs/10 ha) in the reed and meadow habitats.

The community dominance index is a simple characteristic calculated as the percentage of the total abundance of all species in the community that is contributed by the two most abundant species (Fig. 2d). It can therefore be an appropriate characteristic for evaluating the dominance structure of bird communities. Its value was considerably high in the reedbed and meadow habitats that can be explained with the low number of spe-

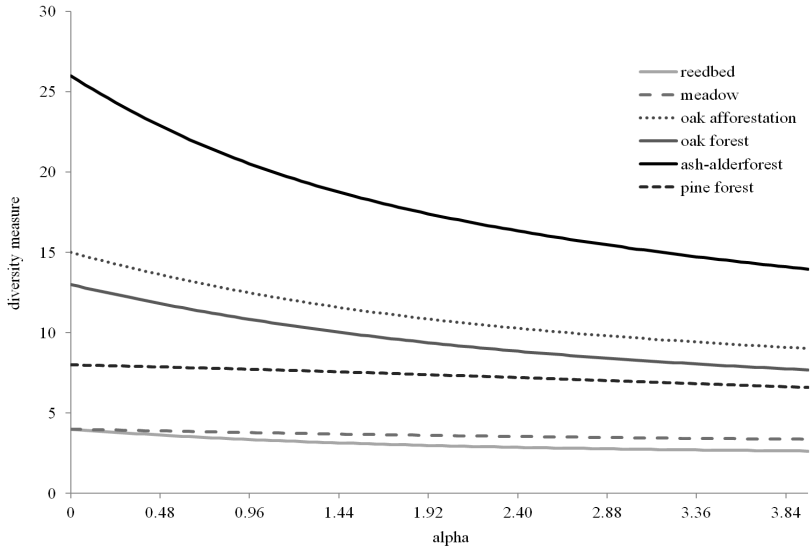

Fig. 3: Diversity profiles of breeding bird communities in the different habitats

cies. The community dominance index was the lowest in the riverine ash-alder forest, thus also indicating an optimal bird community structure consisting of species with no extreme dominance.

The comparison of bird community diversities of the different habitats using Hutcheson's method yielded significant differences in 11 cases (Table 3).

To rank the bird communities of the studied habitats the Rényi's diversity profiles were used (Fig. 3).

The result shows that there was no single case of diversity profiles crossing each other, thus the bird communities can be ranked also confirming the results of the Hutcheson's modified t-test indicating significant differences between diversities of certain communities. The diversity profile of the bird community found in the ash-alder forest runs above the curves of other habitat's communities. It can also be observed that two pairs of diversity profiles, namely the curves of bird communities in the two oak forests (both of the afforestation and of the low pole stand) and also the curves of the two open habitats (reedbed and meadow) run very close to each other.

Results of comparison of breeding bird communities in different habitats carried out using cluster analysis based on the Morisita-Horn similarity index is shown on Fig. 4. The dendrogram well emphasises the differences and similarities between bird communities in different habitat types. The reedbed shows a total separation, which means that no common species occurred between this edge habitat and the other studied habitats. The second main group is further subdivided into two subgroups, where a complete separation can be observed between the 'open' habitats (meadow and young pedunculate oak afforestation) and the 'forest' habitats. Inside the 'forest' subgroup, communities of the ash-alder forest and the low pole oak forest were grouped under the same cluster showing at the same time the highest similarity between paired communities, while the bird community of the only coniferous forest habitat, the Scots pine plantation, discretely separated from the two mentioned deciduous forest's communities.

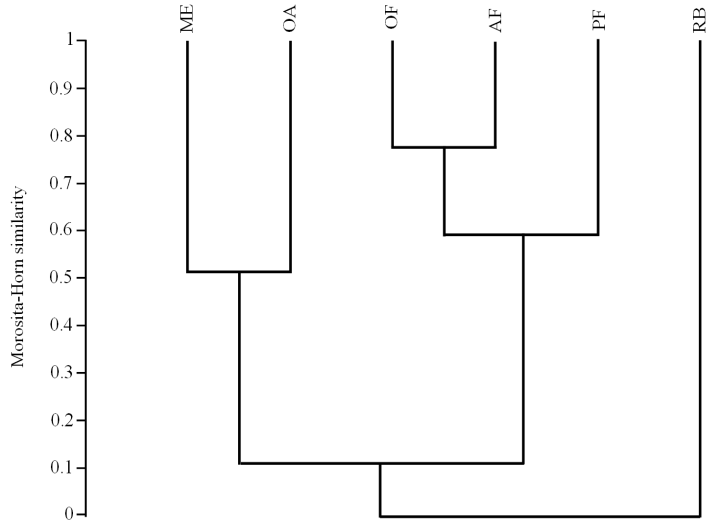

Fig. 4: Dendrogram based on cluster analysis using Morosita-Horn index of similarity on the breeding bird communities of different habitats

(RB – reedbed, ME – meadow, OA – oak afforestation, OF – oak forest, AF – ash-alder forest, PF – pine forest)

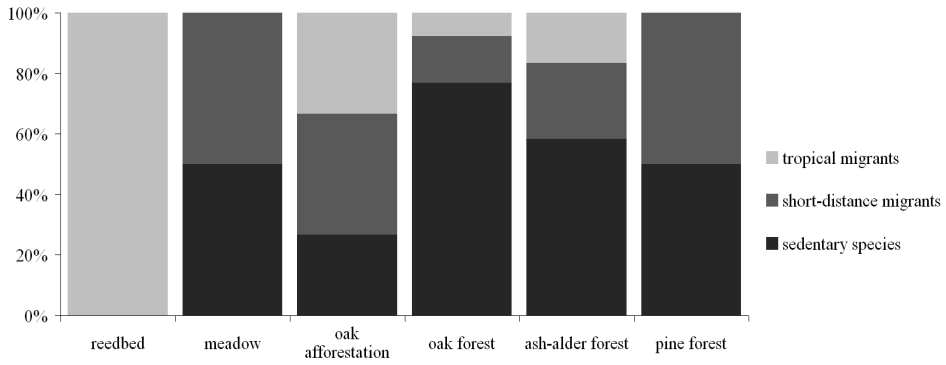

Fig. 5: Classification of bird communities according to the species' migratory habits

The analysis of bird communities according to the migratory habits of the species showed interesting results (Fig. 5). The observed trend is true for both the species richness and density.

The proportion of sedentary species is higher primarily in the forest habitats (reaching its peak in the turkey oak–pedunculate oak forest) while, similarly to other studies (HERRERA 1978, HELLE & FULLER 1978), the cumulated proportion of migrant species (both short-distant and tropical migrants) was higher rather in the open habitats. A probable explanation of this phenomenon might be that the surveyed open habitats (e.g. young afforestations) are showing certain similarities with the wintering areas of the actual species: the open savannas and semi-deserts (BLICKE 1984).

Taking into account the results of the breeding bird survey, the following remark can be drawn as a conclusion. This relatively small area around the artificial lakes has a rich mosaic habitat structure which is optimal not only for waterfowl linked to the fishponds but also for passerine bird communities.

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